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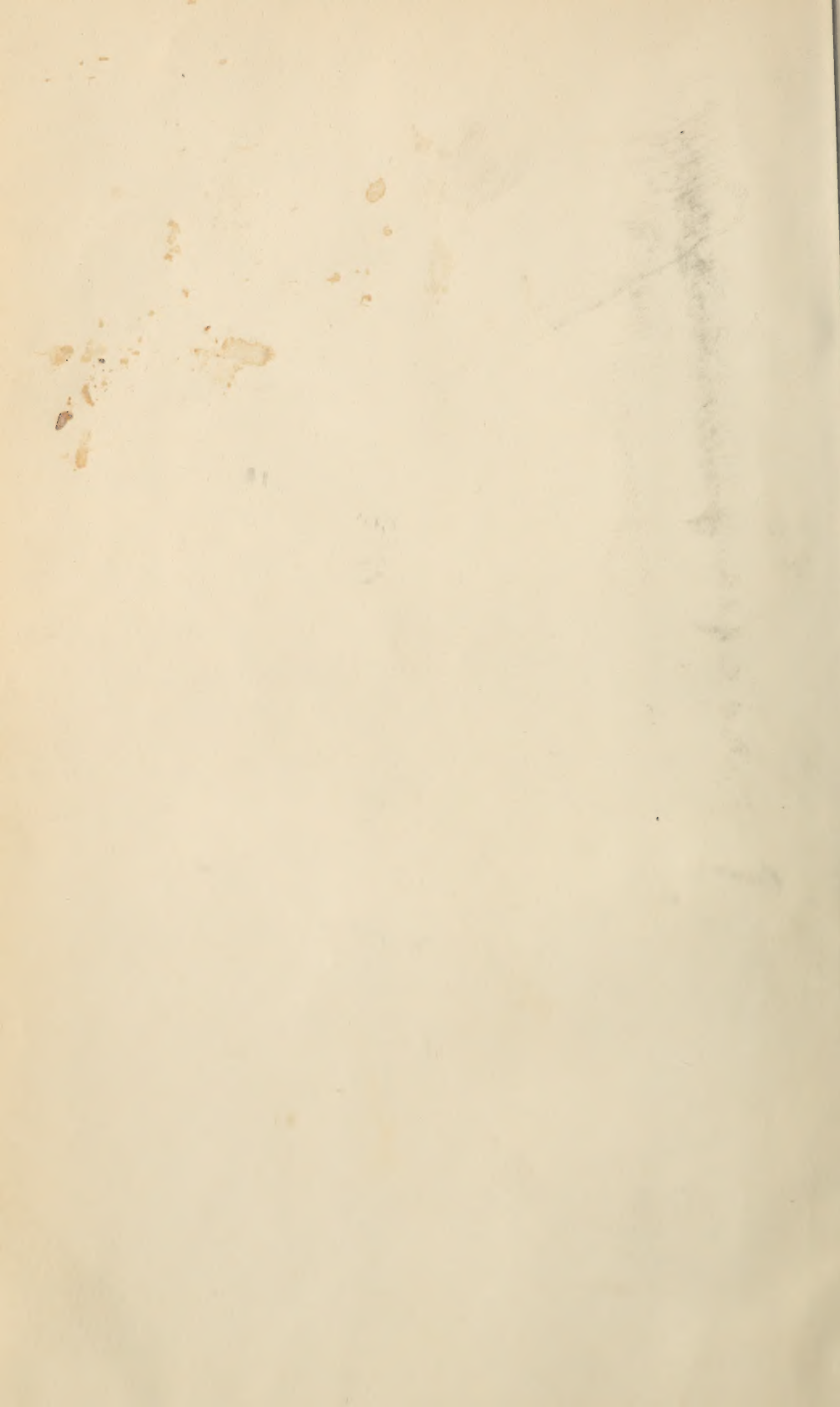
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# TREATISE ON DISEASES

OF THE

# NOSE AND THROAT

IN TWO VOLUMES

BY

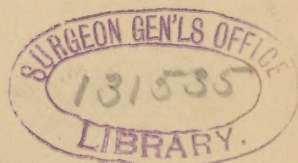
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## Volume One

## DISEASES OF THE NOSE AND NASO-PHARYNX

WITH 4 COLORED PLATES AND 182 WOOD-CUTS



NEW YORK

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## PREFACE.

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THE following work was originally undertaken with the intention of preparing a Second Edition of the volume on "Diseases of the Nose and Throat" published by myself in 1881, but it soon became evident that the great advances made in the study of diseases of the upper air passages during the period which had elapsed since that work was issued, had rendered it necessary to rewrite practically the whole volume. I therefore determined to abandon the attempt to base the present work on my former one, and to write an entirely new treatise. Two chapters, however, of the earlier publication, with some changes and additions, I have retained, viz.: that on "Mucous Membranes" and that on "Taking Cold," for while these subjects may possibly seem somewhat elementary to the older practitioner, to the younger physician and to the medical student, I am confident they will prove of value. Aside from these two chapters, the work is entirely new and has been written without reference to the earlier volume. It has been my endeavor to present a full and complete treatise on the subjects covered by the title, and in carrying out this endeavor the work has grown on my hands in proportions beyond, perhaps, my original conception, and in place of a single volume which I originally contemplated, I have been compelled to divide the work into two volumes. In the first volume, I have embraced, in the first section, a consideration of diseases of the nasal cavities proper, in the second section that of diseases of the naso-pharynx, while I have added a third section in which there is presented brief descriptions of all the various operations which have been resorted to for the removal of growths from the nasal passages or naso-

pharynx, and which involve incision either of bone or the soft parts.

The very large space devoted to a study of diseases of the nose, cannot, I think, subject me to criticism, when we remember the very intricate and highly important functions, which, as we have so clearly learned in the past decade, have their seat in the mucous membrane lining this cavity; and the very wide area of both physical and reflex disturbances which are prone to follow the morbid conditions which are met with there.

A chapter on asthma, in a treatise on nasal diseases, may possibly be considered somewhat out of place; its propriety, however, I am sure will be more generally recognized when the views which I have so long advocated receive fuller acceptance, as I am confident they will, that, in the very large majority of instances, an asthma is dependent primarily upon a diseased condition of the nasal mucous membrane. The separation of the nasal cavity from the naso-pharynx, from an anatomical, physiological, and pathological point of view, has been made in the present volume, more distinctly and more definitely, I think, than has been usually done in our text-books on diseases of the nose and throat. This is as it should be, and clears up much that has heretofore been vague and unsatisfactory in our classification of diseases of these regions.

In the section on "External Surgery" the description of the various surgical procedures which have been resorted to for gaining a wider access to the nasal cavity and the naso-pharynx, will, I hope, prove of value. While I have not deemed it necessary to enter into a fully detailed description of each operation, I have given a brief résumé of each procedure, thus enabling the reader to obtain a somewhat rapid, yet complete, survey of the resources at his command in dealing with the graver forms of neoplasms which are met with in these regions. As far as I am familiar with surgical literature, these various operations have not been heretofore grouped together in so full and complete a manner as in the present volume.

At the end of the volume there will be found a number of colored plates, illustrative of some of the operations described. These have in each instance been made from colored sketches of operations on the cadaver.

It has been my earnest effort to present the study of each disease as fully and as comprehensively as possible; in most instances I have depended entirely on the descriptive text, in others I have introduced illustrative cases, as they seemed to add interest and clearness to the context; while in still further instances it has seemed to me that a better comprehension of the subject would be reached, by presenting a brief résumé of all the cases which have been recorded in medical literature. This latter plan has been followed in the consideration of most of those diseases which are comparatively rare, such as carcinoma and sarcoma of the nose and also of the naso-pharynx, nasal hydrorrhœa, etc.

The work is fully illustrated, but this I have had done designedly. In many instances I have illustrated and described instruments which I do not consider of value. This has been done on the ground that there is oftentimes something of suggestion and even instruction in not only becoming familiar with the methods by which others attempt to carry out clinical indications, but even more in recognizing their faults. The atomization of medicated fluids for application to the upper air tract will always occupy a prominent place in our armamentarium. In the historical account of the development of the atomizer, therefore, I have introduced illustrations of the various devices out of which grew the perfect instrument of the present day. This may not be of any practical value, but I am sure it will prove of interest, and to many, instructive.

In presenting personal views and opinions, I have desired to do so with all modesty, and yet with the positiveness of conviction. In differing with, or in criticising the views of others, I have endeavored to do so with becoming diffidence. In making a complete treatise of the character of the present, it is impossible not to make use of the literary research and compilation of previous



writers ; this I have done in several instances, but in all cases it has been my desire and effort to give full credit therefor. The work has been done for the older practitioner as well as for the beginner and medical student, and from all I ask a kindly acceptance, together with a full indulgence for such faults and errors as may be found in it, for while prepared by a specialist, and undoubtedly largely written from the specialist's point of view, it has been my conscious and strenuous effort, throughout, to present such a thoroughly candid and unbiassed study of the diseased conditions of the upper air tract, as may prove acceptable to the general practitioner.

In closing, I desire to express my great obligations to my associate, Dr. E. B. Dench, for his most valuable assistance to me, not only in the literary research which the volume has required, but also in the preparation of the index, reading of proofs, and other labors incident upon carrying the work through press.

F. H. B.

26 West 46th St.

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## SECTION I.

DISEASES OF THE NASAL PASSAGES.



# DISEASES OF THE NASAL PASSAGES.

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## CHAPTER I.

### METHODS OF EXAMINING THE UPPER AIR PASSAGES.

THE essential physiological process by which the human voice is produced in the larynx, its pitch regulated, and its volume and other qualities governed, was a source of speculation even in the earliest days of medicine, and hence the devising of some method by which the mechanism and movements of the larynx might be inspected during life, exercised the ingenuity of many and able investigators, such as Bozzini, Babington, Bennati, Avery and others, who devised special appliances of various forms for the accomplishing of this purpose. None of these devices proved successful, however, until, among others, Manuel Garcia, a distinguished teacher of vocal music in London, interested himself in the subject. He fully succeeded in obtaining an ocular view of his own larynx and thereby in studying the special function of the vocal cords in phonation, the results of which he presented before the Royal Society of London in a paper entitled "Physiological Observations on the Human Voice."<sup>1</sup>

Garcia's method was exceedingly simple, and consisted in holding an ordinary dental mirror, inclined at a proper angle, well back in the fauces in such a manner that it should receive the direct rays of sunlight, while, at the same time, the visual image was reflected back in the same direction and perceived by Garcia in a hand-mirror held before his eyes. Garcia's observations were published merely as a contribution to vocal physiology. Türk, of Vienna, however, soon after, becoming acquainted with Garcia's experiment, conceived the idea that this method might possess a certain value in the recognition of diseased conditions of the larynx. Failing, however, to improve on Garcia's simple manipulation, Türk

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<sup>1</sup> Proc. Royal Soc. London, Vol. VII., No. 13, 1855.



accomplished no encouraging results. Czermak, of Pesth, however, took up the matter where Türck left off, and improving on his methods, succeeded in demonstrating conclusively that this device might be made to render the greatest possible service to medical science, both as a means of diagnosis and as suggesting improved methods of treatment of diseases of the upper air passages. Czermak's success was due entirely to the fact that, discarding sunlight, he resorted to the use of artificial light, which was managed after the manner already suggested by Helmholtz and perfected by Reute.

It is interesting in this connection to notice what a fortunate train of events led up to the perfected laryngoscope, and how simple the development of it became. At this time, the subject of examining the interior of the eye had, for a number of years, been a subject of study by enthusiastic workers, and became really practicable only when Helmholtz first devised his simple apparatus for illuminating the fundus of the eye, consisting of polished plates of glass, by means of which rays of light were projected upon the retina, the arrangement of which need not be entered upon here, but in which the principle was observed that the illuminating and the visual rays must be absolutely in the same line. Soon after this, Reute substituted for Helmholtz's plates the concave reflecting mirror with the perforation in the centre, which forms the principal feature of the ophthalmoscope. Czermak, substituting artificial light for sunlight, and making use of Reute's concave mirror, succeeded in rendering practicable this method of examining the upper air passages, and is undoubtedly, therefore, entitled to all credit in having introduced an instrument which has proved of such incalculable value in the management of diseases of this region, thus giving birth really to a new branch of medicine, whose great service in the diagnosis and successful treatment of hitherto unrecognizable and incurable diseases, no one at the present day will question. Garcia's and subsequently Czermak's experiments were largely directed to the investigation of the larynx. Hence, the instrument by which the air passages were examined was called the laryngoscope, and the investigation of those diseases which became a subject of study by means of the laryngoscope, was termed laryngology. This has always seemed to me a somewhat unfortunate designation, in that it rather narrowed the field of study, and gave a somewhat undue importance to the larynx; for, very soon after laryngoscopy became practicable, the facility with which the nose and naso-pharynx might be inspected by the same means was recognized, and while these regions were studied with a certain amount of lukewarm interest, the larynx was studied with a degree of enthusiasm which

resulted in a too great refinement of classification, together with an exaggeration of the clinical significance of what were oftentimes trivial departures from the normal standard. This tendency, I think, has undoubtedly hampered us very much in our study of diseases of the upper air passages, and the proper recognition of the development of morbid conditions, especially of a catarrhal nature. Much of this limitation, however, has disappeared at the present day, although undoubtedly much still remains. In the following pages the view will be taken that many forms of inflammatory action in the larynx are really secondary to a diseased condition in the nose or naso-pharynx, and therefore a thorough investigation of these passages is of quite as much, if not greater importance than an examination of the larynx, and hence that a familiarity by practice with the nice manipulations, by means of which the nose and naso-pharynx are examined, is to be sought as of greater importance even than an examination of the larynx, especially in that rhinoscopy requires a much nicer training, both of the eye and hand, than laryngoscopy. In other words, the practice of rhinoscopy is specially urged upon beginners as not only of more importance than laryngoscopy, but as requiring greater manipulative skill, and a better trained eye.

### THE LARYNGOSCOPE.

This term is generally used to designate the special illuminating apparatus by which the upper air passages are examined, and of course applies equally to rhinoscopy and laryngoscopy. The essential features in the art of examining the upper air passages consist in projecting a powerful light through the anterior nares for the practice of so-called anterior rhinoscopy, or into the open mouth for the inspection of the pharynx, or so-called pharyngoscopy. In addition to this, as in laryngoscopy and posterior rhinoscopy, small mirrors are introduced into the fauces, by means of which the illuminating rays are deflected to those parts which are without the line of direct vision, while at the same time visual rays are re-conducted from the illuminated parts back to the retina in the same line as the illuminating rays.

The essential parts of the laryngoscopic apparatus then are: 1. The laryngoscopic or rhinoscopic mirror. 2. The source of illumination, or the light. 3. The concave reflecting mirror.

*The Throat Mirror.*—The laryngeal mirror is a small round mirror encased in a German-silver frame, and attached by its rim to a slender wire stem at varying angles, the whole measuring from six to seven inches in length. They are made in sizes from three-

eighths of an inch to one inch in diameter, and are numbered from 0 to 5, as shown in Fig. 1, actual size, each number increasing one-eighth of an inch in diameter from No. 0 upwards. They were formerly made of various shapes, such as oval, square, oblong, etc., but the round mirror has been found best adapted for all purposes. The best mirrors are made of very thin glass and with a narrow rim such as will afford the largest reflecting surface to the smallest bulk, the stem being sufficiently stout to admit of the application of considerable force without bending. The mirror is attached to its stem at varying angles, although usually at about  $135^\circ$  for laryngoscopy and at about  $105^\circ$  for rhinoscopy. Many attempts have been made to attach the mirror to the stem by an adjustable hinge-joint, without success, however.

*The Light.*—The illumination may be derived from the sun, the oxygen-hydrogen light, a gas-jet, or an ordinary coal-oil lamp. If gas is used, the Argand burner gives undoubtedly the better and

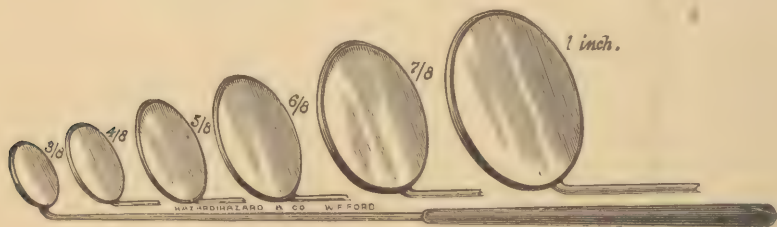


FIG. 1.—Throat Mirrors, Actual Size, from No. 0,  $\frac{3}{8}$  inch in diam., to No. 5, 1 inch in diam.

steadier light, although ordinarily a coal-oil lamp is quite satisfactory in giving a whiter and more intense light than the usual city gas supply, and of these undoubtedly the best is one mounted either with the Duplex or Rochester burner. Sajous<sup>1</sup> states that the whiteness of this light may be increased by dropping a small piece of camphor into the oil, a suggestion which I have verified. The direct rays of the sun afford by far the best source of illumination, and should be used where available in all cases, especially in the first examination of a case, in that it gives a light unequalled in intensity and whiteness by any artificial illuminator that we have. Unfortunately this is not available at all times. Hence, any one devoting his attention largely to this branch of medicine should make use of the oxy-hydrogen light, in that it is only by those powerful illuminators that the parts are brought fully under that nicer inspection which enables us to make the clearest and most thorough diagnosis. Lennox Browne<sup>2</sup> was, I believe, the first

<sup>1</sup> "Diseases of the Nose and Throat," Phila., 1886, p. 7.

<sup>2</sup> "The Throat and its Diseases," Second ed., London, 1887, p. 40.

to devise an apparatus of this kind suitable for office work. This is shown in Fig. 2. It is, however, I think, somewhat unnecessarily

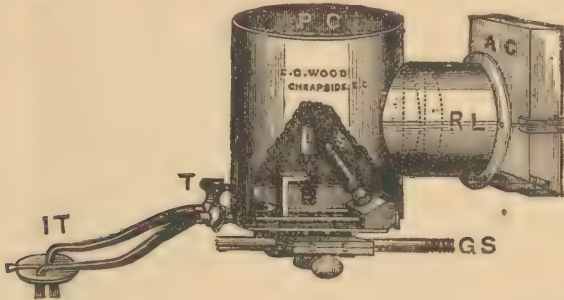


FIG. 2.—The Lennox Browne Calcium Light. *L*, The lime candle; *S*, two concentric tubes through which the gases are directed upon the candle, the inner one connected with the tube at *T* carrying oxygen, the outer one connected with the tube at *T* carrying either hydrogen or common street gas; *P.C.*, a perpendicular cylinder of metal inclosing the light; *R.L.*, a horizontal cylinder containing the lenses; *A.C.*, a glass cell containing water, placed in front of the lenses to arrest the heat rays. The whole apparatus is mounted on a split socket, *D.S.*, which admits of free vertical motion; and this is carried by the metal arm, *G.S.*

complicated. I have, therefore, had constructed for my own use an instrument in which the water-chamber is abandoned as unnecessary and other portions of the apparatus much simplified.

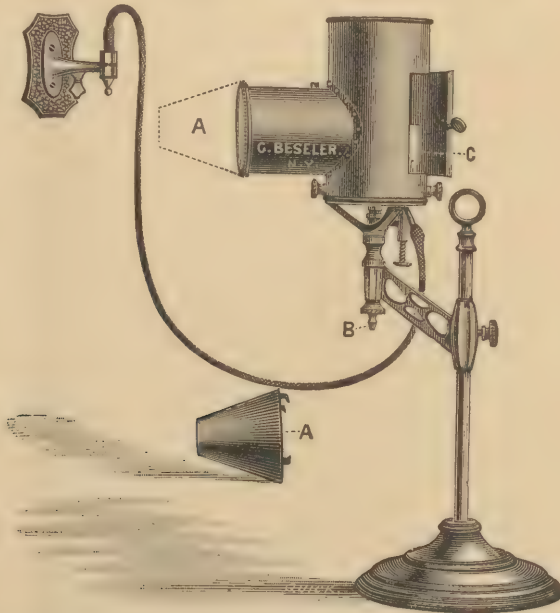


FIG. 3.—Beseler's Lime Light Laryngoscope. *A*, hood for cutting off the rays from the observer's eye; *B*, oxygen supply tube; *C*, lime candle.

The main features of this device are embodied in the instrument shown in Fig. 3. It is light, movable, easily manipulated, and



serves a most excellent purpose, and moreover, is much cheaper than Browne's device. It is manufactured by Charles Beseler, of this city. The expense of the oxy-hydrogen light is about thirty-five to forty cents an hour, burning continuously. It will be understood that in this device ordinary street gas is substituted for hydrogen and seems to serve fully as good a purpose. A very ingenious and exceedingly powerful light has recently been introduced, known as the Wellsbach light, which consists of a hood, as it were, composed of a patented material which, when suspended over a gas-jet which has been converted into a Bunsen burner, is rendered incandescent. This light where available answers a most excellent purpose in examining the upper air passages, although, of course, it is not as powerful as the lime light or the rays of the sun. Sajous' speaks very highly of the so-called albo-carbon light which consists of a metal globe containing a material called albo-carbon, located in such a way that it is subjected to the heat of the flame, while at the same time the gas passes through it before combustion. This, undoubtedly gives a very brilliant white light, but this is due probably entirely to the fact that the gas becomes so far heated before it reaches the burner as to insure the complete combustion of its carbon, although the claim is made that it receives certain gases in passing through this material in the metal chamber which add to the intensity of the flame. The incandescent electric light offers no advantages over the ordinary gas jet or coal-oil lamp. Those various devices by which a small incandescent light is attached to a throat mirror, modelled after Trouve's polyscope, I think are to be regarded as mere playthings and of no practical value, in that a much more powerful light can be thrown into the throat or nose than can be introduced bodily. The same should be said also of the incandescent light attached to the head-band.

*The Reflecting Mirror.*—The really important feature of every laryngoscopic apparatus is the concave reflecting mirror of Reute, in that by means of this device the rays of light are so far converged as to thoroughly illuminate a part, even if the source of the light is not particularly intense, and furthermore this device enables us to manipulate and direct the illuminating rays at our convenience. Whether we examine directly, as through the anterior nares, or whether we deflect the rays by the mirror into the fauces, it is absolutely necessary that this concave mirror be perforated in the centre, in order that the illuminating rays and visual rays shall be exactly in the same line, as it is easy to understand, and does not require any elaborate demonstration to show, that we thus obtain

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<sup>1</sup> Loc. cit., p. 5.

the best inspection of the parts. This mirror may be attached to a simple head-band carried on the forehead, or it may be attached to a fixed apparatus. Fig. 4 represents Schroetter's head band. A stout band passes around the head and is fastened with a buckle. In front there is attached a thick pad which lies against the fore-



FIG. 4.—Reflecting Mirror Mounted on Schroetter's Head-band.

head, and two smaller pads below, which rest upon the bridge of the nose. From the metal plate to which the pads are attached, there projects in front a split socket, regulated by a screw, which receives a ball attached to the reflecting mirror. In this manner it is intended that the mirror shall be held in any position, or turned in any direction in front of the eye. A simpler affair than this is what is known as the Pomeroy head-band, shown in Fig. 5, constructed on much the same principle, but simpler and lighter, doing away with the nose-rest. In both these head-mirrors, the knob which is received into the split socket of the head-band, projects from the back of the mirror-frame; the result is that the lateral

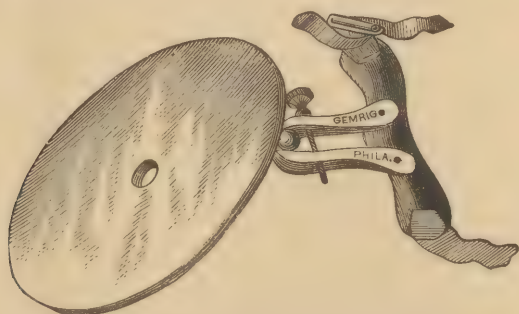


FIG. 5.—Reflecting Mirror Mounted on Pomeroy's Head Band.

motion of the mirror is notably restricted. Furthermore, it has been the custom to make use of mirrors of large diameter, even as great as five inches. The weight of a mirror of this size is objectionable, in that a prolonged examination thus becomes wearisome and even painful. There is no great advantage of illumination gained by a

large-sized reflector. I, therefore, much prefer a smaller-sized mirror, as possessing all the advantages and none of the disadvantages

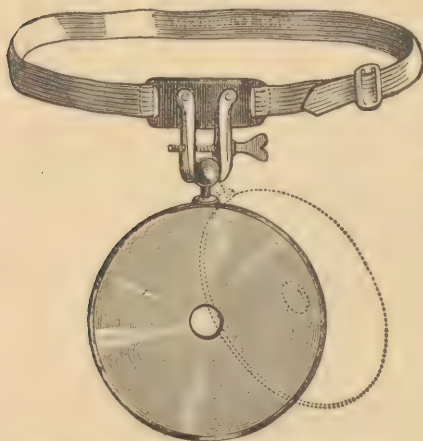


FIG. 6.—The Author's Head Band and Mirror.

of the larger ones. Fig. 6 shows the writer's head-mirror which is two and a half inches in diameter, with the knob attached to the periphery of the frame, thus giving an absolutely unrestricted movement to the mirror, enabling the wearer to turn it freely in any direction. In addition to this, the split socket is only of sufficient size to receive the knob, while the plate to which the socket is attached is but one and a half inches long.

These head-mirrors are usually attached to the head by an elastic band, which is always objectionable. In the writer's head-mirror, the band is made of half-inch alpaca braid, which is worn with much more comfort and possesses sufficient elasticity to maintain the instrument firmly in place. In addition to this, the whole affair is perfectly flat and is carried easily in the vest pocket. A method of arranging the head mirror much in vogue among our English friends is by means of a spectacle-frame, shown in Fig. 7. This is a somewhat cumbersome affair, and, moreover, the field of vision is in no small degree restricted in that the mirror is held at so great a distance from the eye.

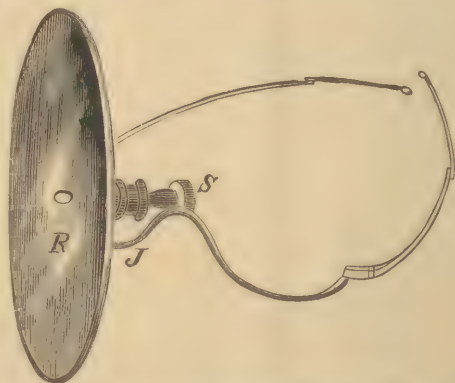


FIG. 7.—Head Mirror Mounted on a Spectacle Frame.

### THE FIXED APPARATUS.

In the early days of laryngoscopy the idea seems to have prevailed that this art could only be practised by means of a somewhat elaborate apparatus. This idea, I think, had its impetus largely in the introduction of Tobold's instrument, which seems to be the

<sup>1</sup> "Laryngoskopie und Kehlkopf-Krankheiten," Dritte Auflage. Berlin, 1874, p. 19

pattern on which most of the laryngoscopes which came later were constructed. This instrument (Fig. 8) consisted of a metal bonnet fitting over a lamp or gas jet, from which projected a cylinder about seven inches in length, containing three double convex lenses, two of which were placed at the proximal end of the cylinder, their faces being in contact, while a larger lens was inserted in the distal end of the cylinder. This apparatus was attached to an upright support from which sprang a jointed arm carrying at its distal extremity the concave reflecting mirror. I have never been able to discover what optical principle was involved in this arrangement of the lenses. Tobold's idea seemed to be that the emerging rays be-

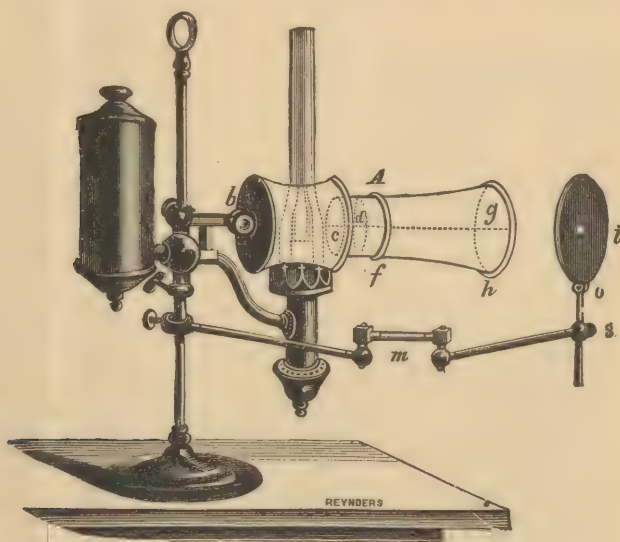


FIG. 8.—Tobold's Laryngoscope Mounted on the German Student Lamp.

came parallel and were subsequently converged by the reflecting mirror. Practically, I do not think this occurs. The only effect of the lenses in the laryngoscope is, that the light thrown into the parts which it is desired to illuminate, assumes the form of a rounded disc, and does not reflect the shape of the flame. The illumination, however, is not increased, and the practical advantage of any laryngoscope cannot be shown, other than as affording a somewhat convenient method of office work. In other words, a simple head-band on the forehead, and a good strong source of light, afford us in every respect as good a method of practising laryngoscopy, as the most elaborate apparatus. Dr. Sass, of New York, modified the Tobold's laryngoscope in presenting an instrument, shown in Fig. 9, of far more elaborate construction, in which the metal hood was



largely increased in size, the light completely shut in, while the cylinder containing the lenses was also much larger. He furthermore inserted two plano-convex, in place of Tobold's three double convex lenses, one at the distal, and one at the proximal extremity of the cylinder. The illustration further shows the heavy standard which Sass devised for carrying not only the laryngoscope, but also the glass inhalers known under his name. In general, however, his laryngoscope does not differ in any of its essential fea-

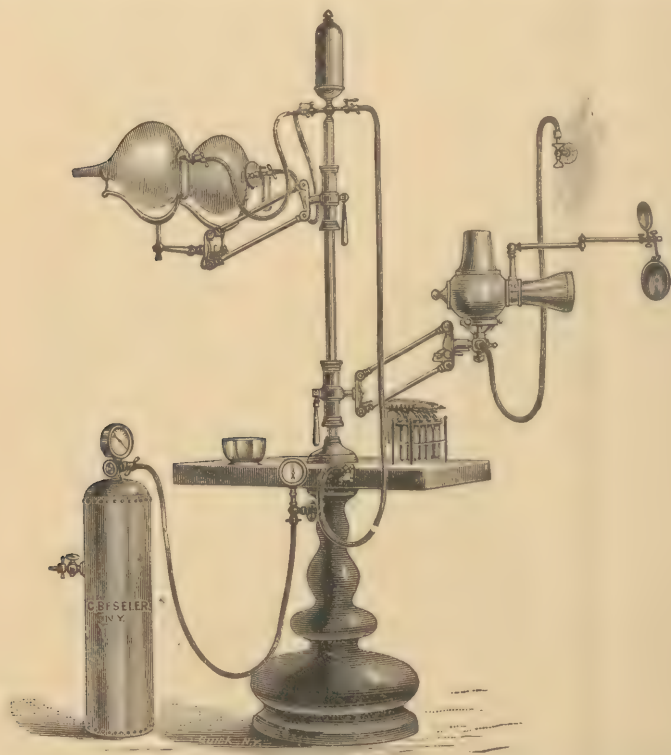


FIG. 9.—The "Sass" Laryngeal Stand, with Globe Inhalers, Atomizing Tubes, and Laryngoscope.

tures from Tobold's. It marked, however, a period in the development of a tendency toward most luxurious and expensive fittings for a throat specialist's office, in that the mere cost of an elaborate Sass laryngoscope, in connection with the pumps and receivers for compressed air, involved an outlay which but few were enabled to meet.

A much simpler apparatus is Mackenzie's light condenser, shown in Fig. 10, which consists of an upright metal cylinder of about three inches in diameter, in the side of which is a fenestra, into which is



fitted a plano-convex lens, two and a half inches in diameter and comprising about one-third of a sphere. This is so constructed as to be easily fitted over a coal-oil lamp or an ordinary gas jet.

It will be observed that in all these laryngoscopes there is an evident design to shut in, as far as possible, all the rays of light except those which emerge from the lenses, the idea being that these examinations should be

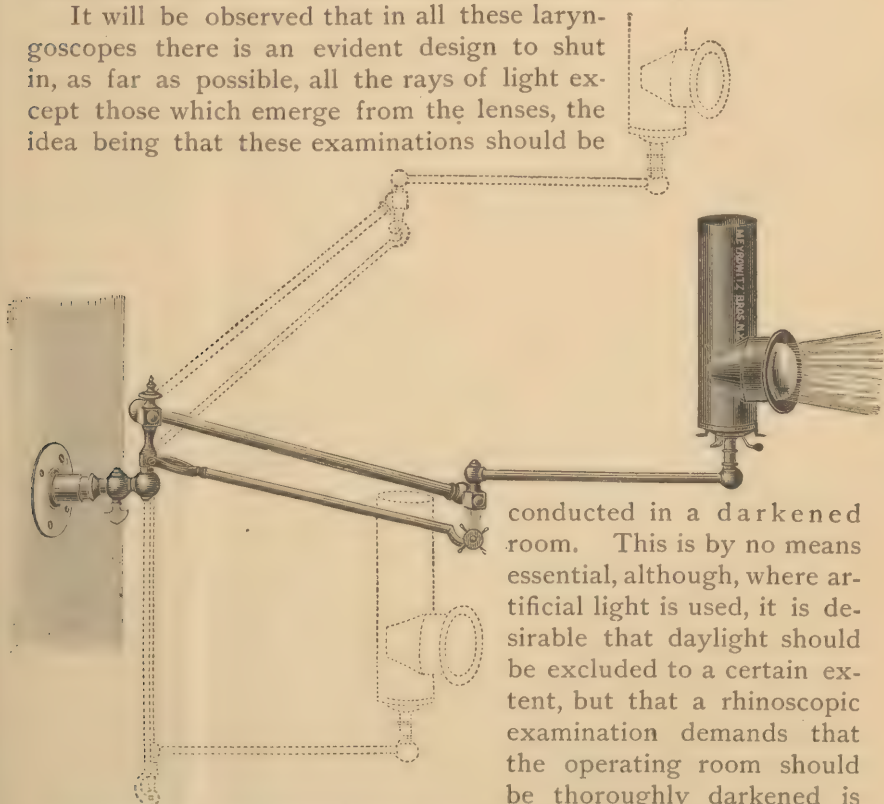


FIG. 10. Mackenzie's Light Condenser Mounted upon a Ratchet Movement Gas-Fixture.

conducted in a darkened room. This is by no means essential, although, where artificial light is used, it is desirable that daylight should be excluded to a certain extent, but that a rhinoscopic examination demands that the operating room should be thoroughly darkened is quite a mistake. As before suggested, I regard the use

of an elaborate larynscopic apparatus as by no means necessary, in that the examinations can be thoroughly well made simply by means of a head-mirror and a good light.

### THE EXAMINATION.

By far the best source of illumination is sunlight. These rays are utilized by using the small device shown in Fig. 16 which consists of a plane mirror, about four inches in diameter, which is mounted on an upright support, to which it is attached by a universal joint. This may be placed in a window, exposed to the sun, and turned in such a direction that the rays of the sun shall be deflected upon the concave reflecting mirror of a fixed apparatus, or

in such a direction as that they will fall upon the forehead-mirror of the operator, as shown in the same illustration. In making use of sunlight, the unpleasant effect of the rays striking directly upon the eye, is easily avoided by placing the heliostat a few feet above the right shoulder of the patient being examined, and in such a manner that the rays shall fall at about an angle of  $45^{\circ}$  upon the mirror.

In the absence of sunlight, a very satisfactory examination can be made by the aid of an ordinary coal-oil lamp or gas jet. In making the examination, the lamp is placed at the right hand of the patient, and at about the elevation of his shoulder, while the operator, sitting in front of him, arranges his head-mirror in such a way that the face of the patient is plainly seen through the perforation, when the mirror is to be turned in such a direction as that the part illuminated is brought under direct vision, without any effort of the eye.

In making an examination with Sass's or Tobold's laryngoscope, the patient is placed in such a manner that the laryngoscope is on his right, and at about the elevation of the face, when the reflecting mirror, supported by its flexible bar, is brought into such a position as to fully intercept the illuminating rays as they emerge from the laryngoscope, and to deflect them upon the face of the patient.

In using Mackenzie's light condenser, the patient is placed in much the same way, while the condenser is so arranged that the rays of light fall upon the head mirror of the operator. A very convenient method of mounting this, is by the ratchet-movement gas-fixtured, shown in Fig. 10, whereby the lenses can be easily adjusted to the level of the mirror on the forehead of the operator. In using this instrument, one's movements are somewhat hampered, in that the head with the mirror attached must be held in one position, which is necessarily somewhat wearisome, whereas with the unhooded lamp or gas jet, the rays can be easily intercepted in whatever position, or at whatever level the head of the operator may be. After all, any method of examination is largely a matter of preference on the part of the operator. There is no great advantage in any, and certainly no great advantage in an elaborate apparatus. If one knows just what one wishes to accomplish, the procedure becomes the simpler as the apparatus is the less complicated. I think, however, while there is a certain amount of convenience in making use of the fixed light, as in the Tobold and Sass laryngoscopes, one should always become thoroughly accustomed to work with the simple head-mirror and ordinary light, in that thus he is not dependent upon elaborate office-fixtures, but can make

his examination in the sick-room, or under whatever circumstances he may be called upon to do so.

A special operating chair is recommended by many authorities as not only adding to the convenience of a laryngoscopic examination, but more particularly as aiding in the performance of the minor operations upon the throat and nose. I have always accustomed myself to the use of an ordinary straight-back chair in my own office work, and believe this method is much to be preferred, in that it better enables the surgeon, in operating outside his office, to adapt himself to improvised conveniences.

### RHINOSCOPY.

The nasal cavity is examined and diseased conditions recognized by illumination and direct inspection through the nostrils, called anterior rhinoscopy, and also by placing mirrors in the fauces in such a manner that the rays of light are reflected through the posterior nares, while at the same time the illuminated parts are seen reflected in the same mirror, and conditions of health or disease recognized. This latter is designated as posterior rhinoscopy.

*Anterior Rhinoscopy.*—This examination is made by dilating the flexible portions of the nostrils by means of a suitable spec-

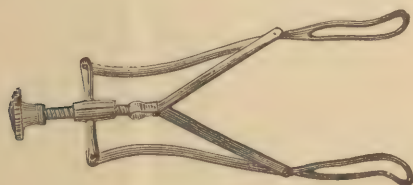


FIG. 11.—Fränkel's Nasal Speculum.

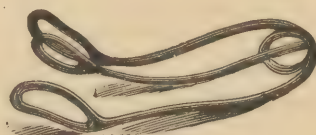


FIG. 12.—Goodwillie's Nasal Speculum.

ulum, and illuminating the cavity by means of light reflected from the concave mirror, so placed that the focus of illumination may fall as nearly as possible upon the part to be examined.

A number of instruments have been devised for dilating the nostril for this inspection. In Fig. 11 is shown Fränkel's instrument, composed of two blades regulated by a set screw. It may be inserted in both nostrils, or in one, at pleasure, and serves to open the parts with considerable force. It is only partially self-retaining, however. Goodwillie's speculum, shown in Fig. 12, is a much simpler device, whose action is evident from the cut. Its third blade, however, it seems to me, accomplishes no good purpose. Elsberg has modified Delaborde's tracheal dilator, by inserting a set screw

to hold it open, as shown in Fig. 13, thus adapting it for use as a nasal speculum. This is an instrument of undoubted value in cases where the parts are rigid, and require to be opened with considerable force. The objection to this speculum is that it occupies one

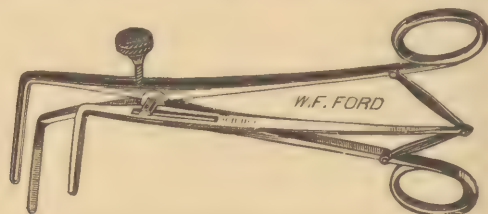


FIG. 13.—Elsberg's Nasal Speculum.

hand in its manipulation. The little device shown in Fig. 14, is an instrument devised by the writer, in which the blades are placed at a right angle to the spring, and is so constructed that the instrument is thoroughly self-retaining, and holds the nostril open excellently well, while at the same time both hands are left free for other

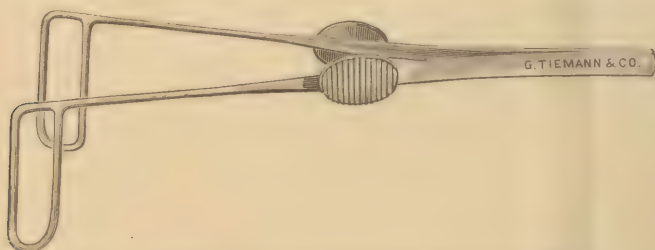


FIG. 14.—The Author's Self-retaining Nasal Speculum, actual size.

manipulations. When properly constructed, this instrument has served a better purpose in my own hands than any of those mentioned. On much the same principle is the convenient little instrument devised by Jarvis, shown in Fig. 15.

In making an examination of the parts, the patient is placed

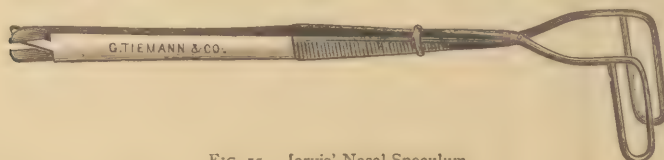


FIG. 15.—Jarvis' Nasal Speculum.

with his face directly on a level with that of the operator, when, the speculum being inserted, the bridge of the nose is grasped firmly between the index and second finger, while, at the same time, the tip of the patient's nose is tilted up by the thumb, with a consider-



able degree of force, as shown in Fig. 16, in order that the light from the head-mirror may be thrown into, and along the inferior meatus. The patient's head, now, is to be turned very slightly, first to one side and then to the other, enabling the operator to successively inspect the lower portion of the septum, and the face of the lower turbinated body. After these have been thoroughly inspected, the head should be thrown backward, as seen in Fig. 17, until the lower border of the middle turbinated body is brought into view, when, by the same lateral motion of the patient's head, the face of this body, and that portion of the septum opposite



FIG. 16.—Method of Making an Examination of the Anterior Nares by Means of Sunlight, the Head of the Patient being in Position for the Inspection of the Inferior Meatus.

is brought successively into view. This backward motion being continued, there is brought under inspection the main portion of the middle turbinated body, and finally its anterior termination, and the vestibule of the nose. This inspection having been made as thoroughly as possible, a ten or twenty per cent solution of cocaine should be thrown in, and sufficient time allowed to elapse for the tissues to undergo thorough contraction, and the blood-vessels to become completely emptied, after which the same process should be gone through a second time. In this manner anterior rhinoscopy becomes of far greater importance even than posterior rhinoscopy, in that by this means the whole of the nasal passages may be brought under examination, from the nostrils to the posterior nares,



and after the membrane has been contracted by cocaine, a part of the glandular structure of the upper pharynx even can be inspected



FIG. 17.—Anterior Rhinoscopy, the Head of the Patient being in Position for the Inspection of the Middle Turbinated Body.

on one or on both sides. By this means, information is obtained as regards the existence, or degree of inflammatory action in the nasal mucous membrane covering the turbinated bones, the extent of hyperæmia, the existence of deformities or deflections of the



FIG. 18.—Anterior Rhinoscopy, Position of the Head for Inspecting the Wall of the Pharynx, through the Nasal Passages.

septum, the presence of polypi or other tumors, the character of the secretions of the part, whether mucus or pus, and the existence

of ulceration, necrosis, etc. In looking directly down the nasal passages, the view of the lower turbinated body is very much foreshortened, but where the cavity has been dilated with cocaine, as before stated, in many cases it is quite easy to recognize the posterior wall of the pharynx, as an elongated, triangular patch, presenting a lighter color than that of the turbinated bodies, and moreover the light, falling directly upon it from the mirror, causes it to stand forth, as it were, a bright, glistening patch in the background. It is always easy to ascertain whether the pharynx is seen by this examination, by directing the patient to swallow, or better still, simply to enunciate the letter K, by which the levator palati muscle is brought into vigorous contraction, and thereby swings across the lower and outer portion of the posterior nares, the movement being easily and immediately recognized. The position of the head necessary for this inspection is shown in Fig. 18.

Another method of examining the nasal cavities consists in dilating each nostril by means of a speculum, after which the illuminating rays are projected into one cavity and against the septum, when the other cavity is to be inspected. It will be found that the septum is so thoroughly translucent that one of the nasal cavities will be fully illuminated by rays of light projected through it. The parts seen in this manner present quite a different picture from that shown by the direct illuminating rays, and information will often be afforded by this method, not easily obtained by the ordinary procedure, in that the light is projected more directly into the recesses beneath the turbinated bones, and hence its prominences and variations from the normal are more easily recognized. In addition to this, transmitted light brings out in a striking manner the irregularities of contour in the septum itself.

*Posterior Rhinoscopy.*—This examination is somewhat more difficult of accomplishment than that through the anterior nares, and requires therefore a nicer manipulative skill and dexterity. In order that these parts may be brought into view, it is necessary to so place a mirror in the pharynx as that light may be thrown up into the posterior nares, while, at the same time, the palate remains completely relaxed, and the tongue is prevented from protruding itself into the line of vision. Occasionally a patient is met with who will depress

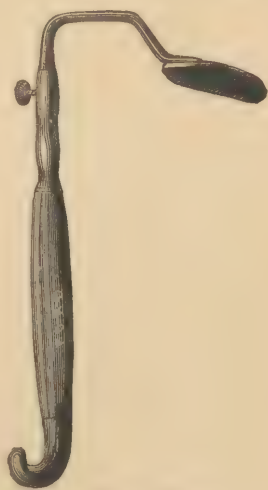


FIG. 19.—Türk's Tongue Depressor

his own tongue in so satisfactory a manner, as to tolerate the examination without the aid of instruments. Ordinarily, however, it is necessary to press the tongue down by means of the spatula. In Fig. 19 is shown Türk's tongue-depressor, a somewhat elaborate and

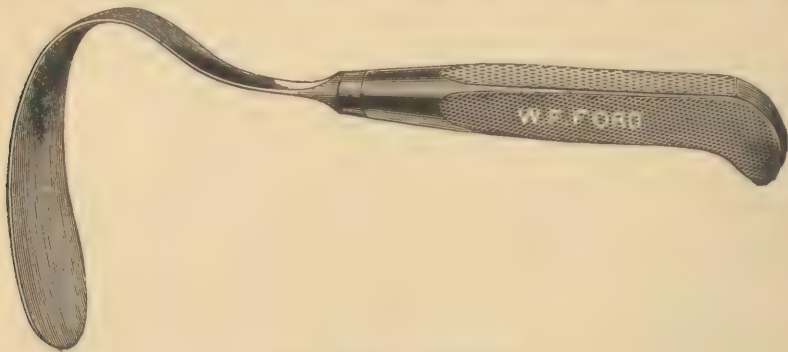


FIG. 20.—Sass' Tongue Depressor.

expensive instrument, which is of value, undoubtedly, where the patient can manipulate the instrument himself. It is usually, however, better for the operator to manage the spatula, in which case this instrument is, I think, somewhat awkward. The Sass spatula (Fig. 20) is also, I think, open to the same objection. Some form of the folding spatula, such as is shown in Fig. 21, is a very convenient instrument, and can also be carried in the pocket.

Depressing the tongue by means of the spatula would seem to be one of the simplest of manipulations, and yet, where awkwardly done, the fauces may be so far irritated as to render the examina-

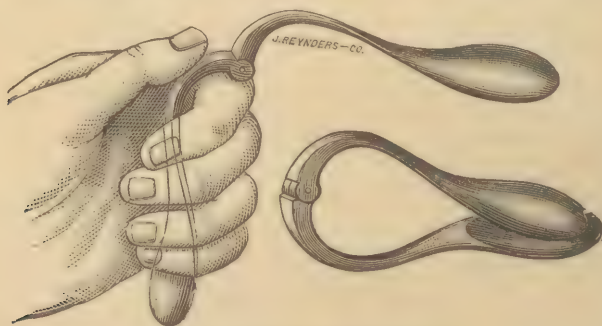


FIG. 21.—Goodwillie's Folding Spatula.

tion entirely impossible; whereas, if properly done, the examination may be made even in cases of exceedingly irritable throat. It should be borne in mind that if the tongue is pressed directly down into the floor of the mouth, its root is pressed backward into the

fauces, which in the majority of cases will cause retching or gagging on the part of the patient. On the other hand, if the tongue is grasped by a spatula in such a way as to press it forward, it can be entirely controlled without exciting any involuntary movements. As best accomplishing this purpose I have had constructed the spatula shown in Fig. 22. The blade is composed of a thin plate of metal three and a half inches long and one inch wide, which tapers toward the handle, which is three inches in length and to which it is attached at a right angle. The blade is fenestrated at its distal extremity to permit of an arching of the tongue into it by which the organ is more firmly grasped, and is slightly curved.



FIG. 22.—The Author's Tongue Depressor.

A self-retaining tongue depressor is usually not well tolerated by the patient; where feasible, however, the advantage of this device is quite obvious. Church's instrument, shown in Fig. 23, is perhaps the best of these.

In introducing the tongue depressor, its beak should always be carried beyond the arch of the tongue, that is beyond the highest point to which the tongue is visible; otherwise, in pressing

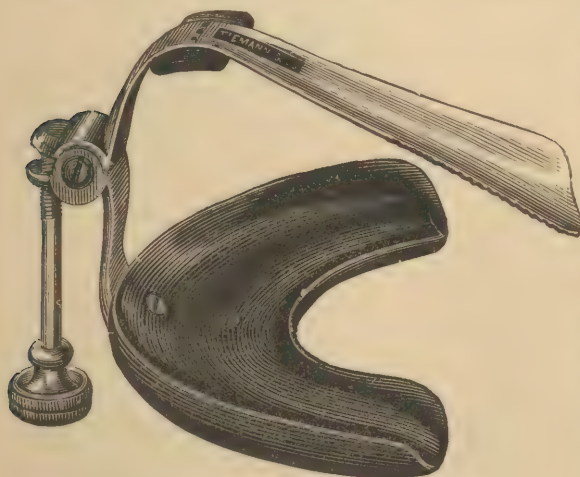


FIG. 23.—Church's Self-retaining Tongue Depressor.

retching. The spatula should be held between the thumb and the forefinger, the thumb pressing against its angle, while the second finger passes under the chin of the patient. In this man-

it downward, its anterior end will be depressed, while its centre will arch up and interfere with the inspection. Furthermore, the beak of the spatula should be carried just far enough to cover the arch of the tongue, and no farther; otherwise, its pressure on the sensitive parts near the base of the tongue will be liable to excite



ner a grasp is maintained of the lower jaw, and control of the movements of the head secured. Then the tongue should be pressed, not downward, but downward and forward, by a rotary movement of the spatula, the beak of the instrument being made to revolve in the arc of a circle which has its centre in the teeth of the lower jaw. If this movement is made with a slow but firm pressure, the whole of the lower pharynx will be brought into open view, while at the same time the palate remains pendulous and relaxed. If retching occurs during this manipulation, the attempt

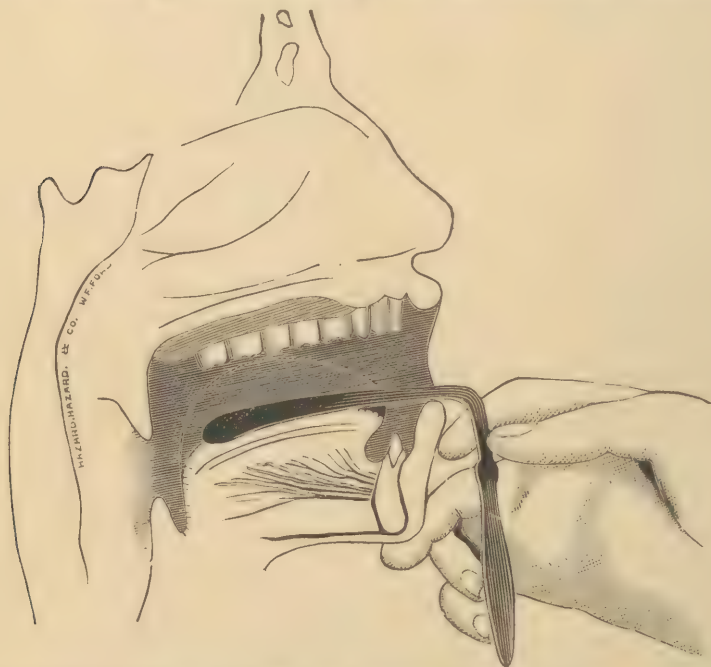


FIG. 24.—Method of Depressing the Tongue for Examining the Pharynx and for Posterior Rhinoscopy.

should always be abandoned for the time, and a few moments of rest given. The position of the hand and the spatula is well shown in Fig. 24.

The tongue being depressed, and the palate seen to be relaxed, a rhinoscopic mirror should now be selected, the size of which should be determined upon by the space seen to exist between the base of the tongue and the border of the palate. The largest mirror should be selected which can be introduced without touching the parts, in that the parts to be brought under inspection, depend entirely for their illumination on the amount of light reflected from the rhinoscopic mirror, and, of course, the larger the mirror the better the illumination. The rhinoscopic mirror, as before noted,



is attached to its stem at an angle of about  $105^{\circ}$ . This should be held lightly in the right hand (see Fig. 25), and passed backward somewhat edgewise, in order that it may pass through the niche between the uvula and right pillar of the fauces, in such a manner that it may not touch the parts, there not being, as a rule, suffi-

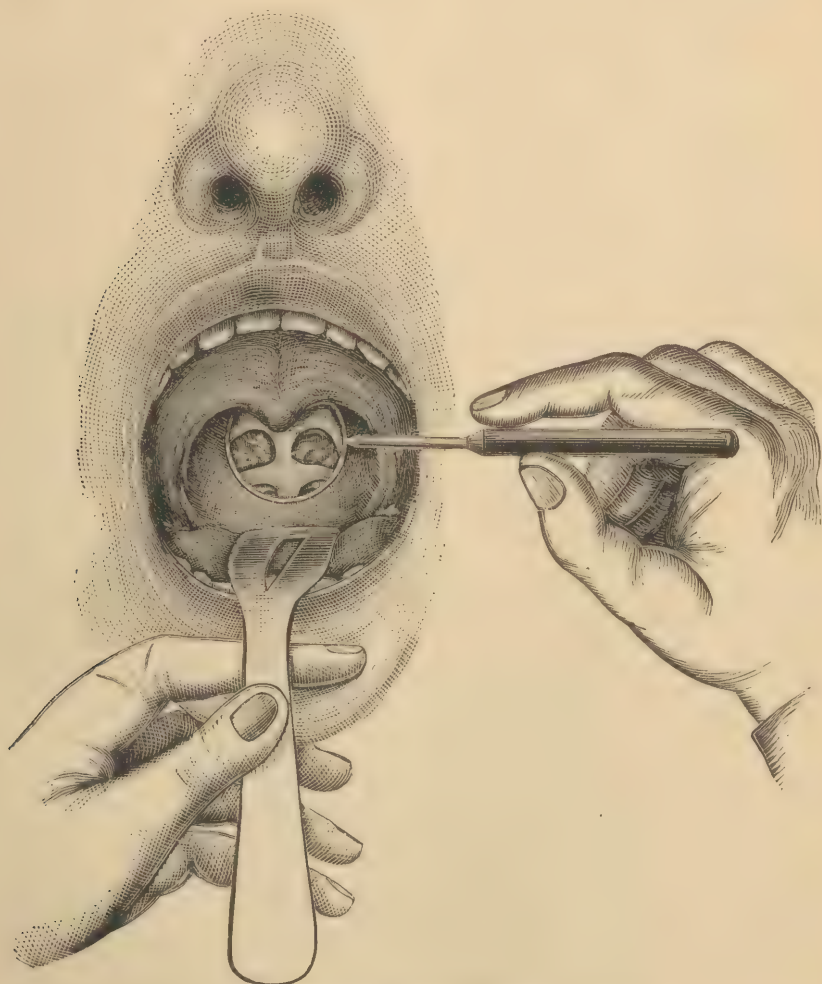


FIG. 25.—Method of Making a Posterior Rhinoscopic Examination.

cient room for it to pass under the uvula. After it has reached the pharyngeal space behind the palate, by slightly rotating the handle from right to left between the fingers, the reflecting surface should be brought around so as to face the operator, and the mirror carried upward until its upper border is slightly hidden by the soft palate.

The position of the mirror should now be at a right angle with the line of vision, and inclined slightly backward, the handle being held at one side, with its shaft lying against the corner of the mouth, as seen in Fig. 25. The tongue being well under control, the main difficulty of examination now lies in the inability of the patient to control the movements of the palate. If the palate is touched in the slightest degree during the manipulation, it is immediately drawn up against the posterior wall of the pharynx, and of course, the examination entirely prevented. This will only be overcome by the exercise of great care and patience in the manipulation. If a patient is directed to breathe through the nose, while the tongue is being held by a spatula, he will find it an exceedingly difficult thing to do. He can, however, oftentimes succeed in relaxing the palate by uttering a nasal sound. Much aid, therefore, will be obtained if the patient be directed to say "Eh," giving it as full a nasal twang as possible. If there is still difficulty in controlling the movements of the fauces, they should be anæsthetized by means of a ten or twenty per cent solution of cocaine. This is an exceedingly unpleasant application to the fauces, giving rise to a curious sensation of choking or feeling of suffocation, and yet it is never attended with anything more than a temporary inconvenience.

As a last resort, other means failing to control the movements of the fauces, we may proceed to tie up the palate after the manner first suggested by Desgranges.<sup>1</sup> This procedure consists in passing a cord through each nostril to the pharynx, and drawing it out through the mouth, when it is passed over the ear on each side and tied behind the head. By this means a gentle traction can be exercised on the palate, under which it gradually yields, and is finally folded on itself, as it were, and a broad space afforded for inspection of the parts above. This device of Desgranges is very simple, easily accomplished, and fairly well tolerated by the patient, and should always be resorted to in any case where it would add to the completeness of a diagnosis. An ordinary cord is somewhat irritating and not easily passed. Better still we may use a soft rubber cord, as first suggested by Wales,<sup>2</sup> about one-eighth of an inch in diameter and a yard long. The ends are passed successively, first through one nostril and then through the other, until they emerge in the fauces, when they are drawn out through the mouth, and tied behind the neck, or held by an assistant. Their passage is facilitated by smearing the rubber with oil. If any difficulty is experienced in passing the cord, a small velvet-eyed English catheter may be used, the stylet being

<sup>1</sup> Cited by Brevet. Thèse de Paris, No. 117, 1855.

<sup>2</sup> Med. Record, 1875, vol. x., p. 785.

inserted for passing it through the nares. This procedure is quite easy of accomplishment, and secures all that can be desired in the way of drawing forward the palate for inspection or treatment of the upper pharynx. Unfortunately, many patients will

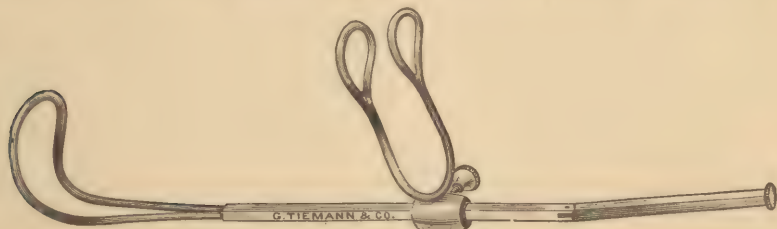


FIG. 26.—White's Self-retaining Palate Retractor.

easily tolerate the manipulation but for a brief period, perhaps no longer than is sufficient to make the examination.

Palate-hooks, palate-retractors, combination rhinoscopic mirrors with retractors, such as Duplay's instrument and other devices of this sort, I have never found of any practical value. The best of these probably is the instrument shown in Fig. 26 which has been devised by Dr. Jos. A. White.<sup>1</sup>

#### THE RHINOSCOPIC IMAGE.

The mirror being placed in the position described, there will be brought into view the oval-shaped openings of the posterior nares.

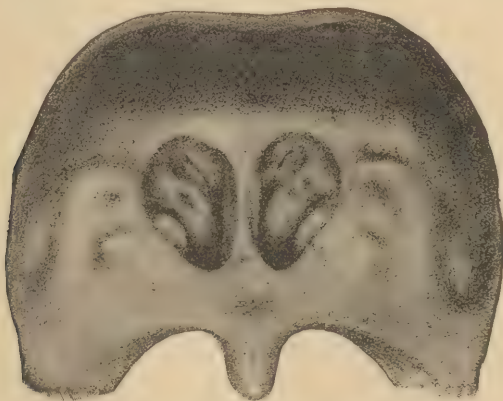


FIG. 27.—The Posterior Nares.

This posterior rhinoscopic image is shown in Fig. 27, although it should be borne in mind that these parts are only seen in detail and not as a whole. Separating the choanæ, in the median line will be

<sup>1</sup> Virginia Med. Monthly, March, 1888.



seen the septum, broad above and tapering to a sharp and narrow edge below. On each side of the septum will be seen, as dark cavities, the nasal passages, with the turbinated bodies projecting into them, from the outer wall of each. The superior turbinated body will be just visible, a light reddish band, in the upper part of the image, emerging as it were from the shadow, and seeming to slant upward and forward. Immediately below it, and separated from it in the posterior portion by a dark line, the superior meatus, will be seen the middle turbinated body, appearing as an elongated and somewhat fusiform projection, of a yellowish-red color. Below this again may be seen a considerable portion of the middle meatus, and below this the upper half of the inferior turbinated body, of much the same color as the middle, and giving the impression of a somewhat elongated mass resting on the floor of the nares. The inferior meatus and floor of the nares cannot be brought into view. If, now, the mirror be turned somewhat to one side, there will be seen the eminence surrounding the orifice of the Eustachian tube, separated from the posterior wall of the vault of the pharynx by the sinus of Rosenmüller. The Eustachian tube being seen in profile, the orifice simply shows a dark line on a bright yellow background, which is the anterior wall of the depression leading into it.

By changing the inclination of the mirror now to a more obtuse angle, there will be brought into view the dome-like cavity of the vault of the pharynx, presenting a somewhat irregular outline, the surface being marked by furrows and depressions which indicate the site of the pharyngeal tonsil; the parts becoming smoother as the view passes down, until there is seen the deep red, smooth, shining surface of the mucous membrane of the lower pharynx. In adult life, however, as we know, the glandular structures of the pharyngeal vault undergo a certain amount of atrophy, and hence are not prominently visible. In these cases we simply bring into view the smooth surface of the mucous membrane lining this cavity. This change in the inclination of the mirror is best accomplished by simply turning the handle in the fingers, as the attempt to accomplish it by elevating or depressing the hand, is liable to end in causing retching. To obtain a complete inspection of the vault of the pharynx, it will generally be found best to change the mirror and use one mounted at an angle of  $130^{\circ}$ , the same used in making a laryngeal examination.

This examination reveals the condition of the mucous membrane of the nasal cavity, the variety and extent of such hypertrophic thickening as may exist in nasal catarrh, the condition of the pharyngeal tonsil, the extent of hypertrophy that may exist there, the character and amount of the secretions from the parts,

the existence of tumors in the nose or vault, ulceration, necrosis, etc.

As regards the nasal cavity, not much information is obtained by this inspection, that cannot better be obtained by anterior rhinoscopy. Thus, morbid conditions of the septum I have never seen shown in this way, except the hypertrophy of the mucous membrane on either side posteriorly, in connection with hypertrophic rhinitis. Occasionally, however, small polypi well up beneath the middle turbinated body posteriorly, are seen, where the anterior examination fails to reveal them. The pus discharged from the accessory sinuses can be recognized also in this manner, although usually this is best detected by the anterior examination.



## CHAPTER II.

### METHODS OF TREATING THE UPPER AIR PASSAGES BY MEANS OF INSTRUMENTS.

IN the local treatment of the mucous membrane of the upper air passages, resort has been had to various mechanical devices, by which the parts were thought to be more thoroughly and efficiently medicated. Thus, various forms of brushes have been devised, together with sponge-holders, douches, atomizers, etc. In the earlier days of laryngoscopy, a considerable amount of importance was attached to these various methods. I think no one will question, at the present time, that their value was greatly over-estimated, and that in the discussion as to the comparative merits of the different methods by which local applications were made, we often-times lost sight of the question as to how far these applications were efficacious in curing or relieving diseased conditions. With our larger knowledge of the physiology and pathology of the mucous membranes of the upper air passages, our dependence upon these various instrumental aids has greatly diminished, and a large majority of them are thrown aside for the simpler methods by which the desired end is accomplished, now that the indications for treatment have become so clear, positive, and direct. Local applications by means of brushes, largely resorted to in former years, have fallen almost completely into disuse in this country. Those desiring still to make use of this instrument will require no directions for carrying out the procedure. The same, I think, can be said of sponge-holders or probes for holding pledgets of cotton. As regards the use of solids, such as nitrate of silver, chromic acid, etc., the methods for their use will be described in the chapters devoted to the consideration of those diseases in which the use of these remedies is indicated.

#### INSUFFLATIONS.

The use of snuffs, and their application by means of specially devised instruments, possesses a certain amount of value in the treatment of the upper air-passages, as was recognized by Galen,<sup>1</sup> and

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<sup>1</sup> "De Compositione Medicamentorum Localium," etc., lib. vii., cap. 3.

is resorted to by most physicians up to the present day. These may be used by auto-insufflation or by special applicators. Among the earliest mechanical devices for insufflation was that of Pserhofer,<sup>1</sup> which consisted of a perforated reservoir containing the powder,

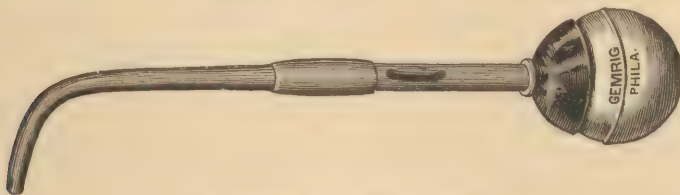


FIG. 28.—Rauchfuss' Insufflator.

to which was attached a tube extending into the mouth, the powder being drawn up into the air passages. A somewhat similar device was used by Prof. Darwin, while Burow<sup>2</sup> accomplished the same result by means of a simple tube. The first to suggest an instrument by which the powders are thrown into the upper air passages



FIG. 29.—Lefferts' Insufflator.

was Rauchfuss, whose instrument, shown in Fig. 28, consisted of a long curved tube, with a fenestra, covered with a slide, through which the powder is inserted. The proximal end of the tube is fitted with a soft-rubber bulb, pressure on which expels the powder from the tube, the distal extremity of which is curved to direct the



FIG. 30.—Ely's Powder Blower.

powder upon the diseased part. Rauchfuss's instrument is rather awkward of manipulation—an objection which is avoided by attaching a rubber tube with a mouth-piece to the proximal end of the tube, as in Lefferts' insufflator shown in Fig. 29, thus enabling the

<sup>1</sup> Schmidt's Jahrb., 1856, vol. 92, p. 170.

<sup>2</sup> Deut. Klin., 1853, No. 21.

manipulator to expel the powder from the tube by blowing, and thus depositing it upon the part which it is desired to medicate. An objection to the tubes is that they deposit the powders in mass.



FIG. 31.—Stoerck's Insufflator.

A very ingenious instrument is shown in Fig. 30 which is usually attributed to Ely, of Rochester. It consists simply of a glass bottle, through the cork of which there pass two tubes bent at a right angle immediately above their point of entrance. To one of the tubes is attached an air-bulb, while the other is bent at its distal extremity, upward or downward, or in whatever direction it is desired to carry the powder. The tube to which the air-bulb is attached passes down into the lower portion of the bottle, while the other merely passes through the cork. The powder having been placed in the bottle, a quick pressure on the air-bulb drives a current of air down into the bottle, which striking the powder, stirs it into a cloud, and at the same time drives it out through the other tube, and deposits it upon the part it is desired to medicate, in a state of fine and even diffusion. This instrument, made of hard rubber, can be obtained of the instrument makers, or any one having a stock of glass tubing may make his own supply. This is unquestionably the best insufflator in use. Its advantages are that it thoroughly diffuses the powder, that it deposits it in a smooth thin film, that it does not pile it on any of the parts, and that it carries it throughout the sinuous cavities. Its only disadvantage is that it does not enable the operator to estimate nicely the amount of powder used, though, as a rule, this is of no consequence. Fig. 31 represents Stoerck's insufflator which combines the advantages of all the above-mentioned instruments. It consists of a small central chamber for the reception of the powder, fitted with a movable cover. Projecting from this is the long curved tube for directing the medicament to the part it is desired to reach. At its proximal end it

is provided with a tapering socket, communicating with the powder chamber by a tube containing a spring cut-off. This instrument is intended for use in connection with the compressed air apparatus. Its working is obvious; the distal point being placed in position to throw the powder in the

desired direction, and the instrument connected with the air chamber, pressure on the valve lets on a sudden blast which drives the powder to the spot intended to be reached.

The advantage to be gained by the use of powders, is a certain amount of permanency of action, as they remain for some time in contact with the part, and becoming slowly dissolved in the mucus, are absorbed by the membrane. The remedies usually employed in this form are tannin, bismuth, alum, borax, ferric alum, zinc, nitrate of silver, iodoform, opium, morphia, belladonna, benzoin, sanguinaria, galanga, etc. When it is necessary to reduce the strength of an agent, it may be combined with pulv. cretæ, pulv. acaciæ, magnesiæ carbonas, sacch. alb., etc. If the powder is heavy, it may be rendered lighter by combining with powdered starch or lycodium.

### DOUCHES.

Fluids may be thrown against the diseased membrane of the larynx, pharynx, or nasal cavity by means of syringes and douches of forms variously devised for special ends. Fig. 32 shows the ordinary post-nasal syringe, a common barrel syringe, fitted with a



FIG. 32.—Post-nasal Syringe.

curved tube which terminates in a rose douche, delivering jets in every direction. This may be passed up behind the soft palate for injecting through the nasal cavities, or it may be turned downward for injecting the pharyngeal cavity. Fig. 33 represents the pipe of the same instrument fitted for use with the Davidson syringe. It

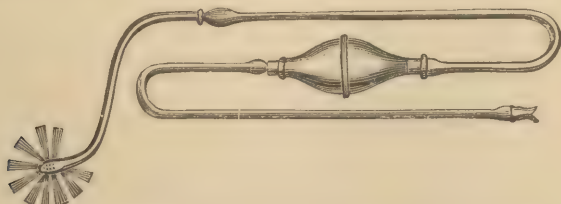


FIG. 33.—Post-nasal Pipe fitted to the Ordinary Davidson Syringe.

is equally adapted to the fountain syringe. For injecting through the anterior nares, an ordinary ear syringe answers the purpose very well, but better still is the post-nasal syringe shown above, with the tube straightened. This can be introduced well into the cavity if



desired. Fig. 34 shows the instrument sold in the drug stores as Warner's Nasal Douche, a very convenient device for cleansing the naso-pharynx, in cases where the patient can acquire the necessary skill for manipulating it himself. The use of the syringe is to a certain extent limited, in that it is probably not specially indicated in

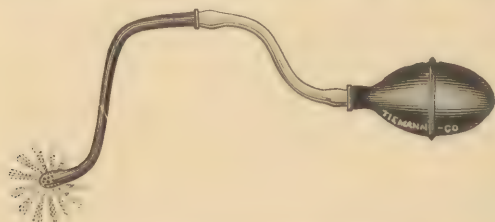


FIG. 34.—Warner's Post-nasal Douche.

other than the atrophic form of chronic rhinitis, in naso-pharyngeal catarrh, and possibly in syphilitic ozæna.

The nasal douche is an expression which we ordinarily use to define the application of a continuous stream of water through the nasal cavities. The principle on which it acts was first suggested by Weber,<sup>1</sup> who, in conducting a series of experiments on the sensi-

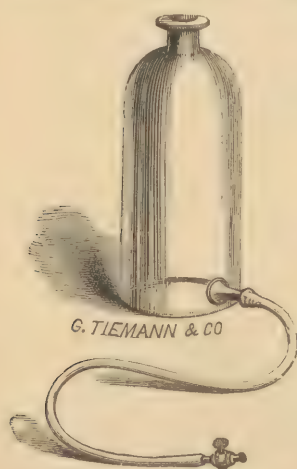


FIG. 35.—The Ordinary Form of the Nasal Douche.

bility of the nasal mucous membrane, observed that when a fluid was introduced into the nasal cavities, the soft palate was lifted so firmly against the posterior wall of the pharynx, as to completely prevent the escape of the fluid into the parts below. Acting on this idea, Thudicum<sup>2</sup> introduced what is now known as the nasal douche, which is shown in Fig. 35. It consists of a reservoir, from the bottom of which leads a rubber tube terminating in a rounded tip so shaped as to fit into the nostril. This tip being placed in the nostril, the reservoir containing the fluid is to be raised above the head, which is bent over a bowl as shown in Fig. 36. As the reservoir is raised, the fluid enters one nostril,

and passing around the posterior border of the septum, escapes through the other in a continuous stream, probably reaching pretty thoroughly the whole of the mucous membrane of the two

<sup>1</sup> "Ueber den Einfluss der Erwärmung und Erkältung der Nerven auf ihr Leitungsvermögen." Müller's Archives, 1847, p. 351.

<sup>2</sup> London Lancet, Nov. 24th, 1864.

chambers. In Thudicum's original instrument, the reservoir was fitted to a standing rod in such a way as that its height could be regulated according to indications. The little device shown in Fig. 37, which was first suggested by Dr. Dessar,<sup>1</sup> is somewhat unique in its simplicity and would seem to afford a convenient method of applying fluids to the nasal cavities, especially of young children, where a more complicated apparatus cannot well be used. Woakes's<sup>2</sup> nasal irrigator is also constructed on much the same plan.

The value of the douche, as a means of applying cleansing fluids to the nasal cavity in certain cases, cannot be denied, especially in atrophic rhinitis, and perhaps syphilitic necrosis. In these affections, of course, it is not a curative measure, while in the ordinary chronic inflammatory action with hypertrophy, it probably not only fails to be of permanent value, but may be mischievous, as first suggested by Roosa,<sup>3</sup> who reported a number of cases of acute otitis media resulting from its use, attributing this accident to the entrance of fluids into the middle ear. I think it is to be borne in



FIG. 36.—Method of Using the Nasal Douche.

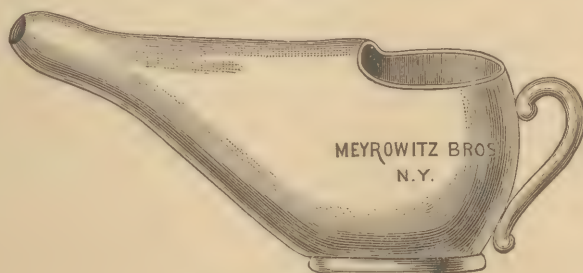


FIG. 37.—Dessar's Nasal Cup.

mind here, that the very large proportion of cases of hypertrophic rhinitis of long standing, suffer from a mild form of mid-

<sup>1</sup> N. Y. Med. Record, 1889, vol. xxxv., p. 280.

<sup>2</sup> "Post-nasal Catarrh," Phila., 1884, p. 154.

<sup>3</sup> Archives of Ophthalmology and Otology, vols. i. and ii.

dle-ear disease, which acts as a predisposing cause of the acute form, which probably may be precipitated by the use of the douche. Considering, however, this possible danger, and the fact that the use of the douche probably accomplishes no good result in hypertrophic rhinitis, its use in this affection is therefore to be condemned unreservedly. In atrophic rhinitis, the danger of middle-ear disease from its use is absent, and I consider the douche of great value in this disease, and see no reason for hesitating to recommend it.

### ATOMIZERS.

Following out the idea that the successful treatment of catarrhal affections depended on our ability to thoroughly reach the parts with our medicating fluids, the plan of reducing our solutions to a state of fine atomization would naturally suggest itself as affording the best method by which they could be carried into the sinuous passages of the nasal cavities, or thrown into the air passages below. In view of the very large extent to which the use of atomizers has grown in late years in the treatment of diseases of the upper air passages, it becomes a matter not only of historical, but also to a certain extent of practical interest, to trace their development from the cruder devices of former days, to the perfect instruments now provided for our use. This system was first put in practice at certain of the mineral springs of Europe. As these waters were considered as possessing notable virtues, both when taken internally, and as used for bathing, it occurred to the proprietors of these springs, that their local action upon the mucous membrane in the air tract might be equally efficacious. For this purpose, a large number of minute jets of water were projected against the walls of the chambers into which patients, well covered with water-proof clothes, were introduced for the purpose of inhaling the sprays thus produced. The first to carry this plan of treatment into operation was Auphan<sup>1</sup> at Euzet-les-Bains, the same device being subsequently adopted at Lamotte-les-Bains, and by Sales-Girons,<sup>2</sup> who, in conjunction with Flubé, elaborated the system more fully than had ever been done before, and published his results. Sales-Girons also constructed a portable atomizer shown in Fig. 38 by means of which inhalations could be given of any medicinal agent other than the natural waters, the principle being much the same as that already suggested. This instrument was the precursor of a large number of devices for accomplishing the same

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<sup>1</sup> Cohen: "Inhalation, its Therapeutics and Practice," Phila., 1876, p. 184.

<sup>2</sup> "Thérapeutique Respiratoire," Paris, 1858.



purpose, such as the Néphogène of Mathieu,<sup>1</sup> shown in Fig. 39, and the atomizers of Lewin, Waldenburg, Schnitzler, Fournier and others, based on different principles of action, all of them, however, somewhat crude and imperfect. In 1863, Dr. Nathanson suggested to his friend Dr. Bergson,<sup>2</sup> that if a current of air be driven through one tube, placed at right angles to a similar tube which led to a reservoir of water, a vacuum would be created, by which

the water would be drawn up into the vertical tube, until meeting the current of air, it would be broken into a fine spray. On this principle were constructed what are usually known as Bergson's tubes. Bergson, in constructing his apparatus, supplied the air current by means of a pair of rubber bulbs connected by tubing, pressure

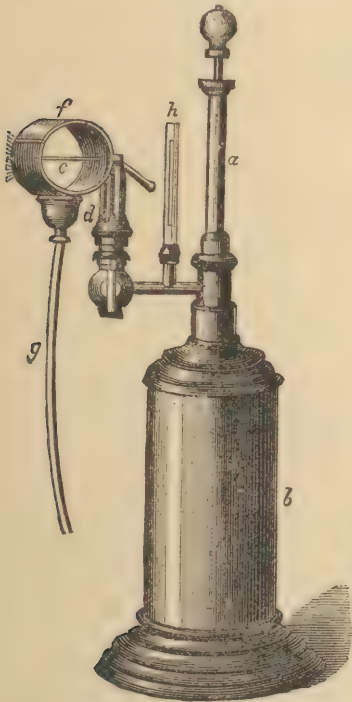


FIG. 38.—Sales-Girons' Portable Atomizer (Cohen). *a*, Compression pump; *b*, reservoir; *c*, stream of fluid about to strike the button, which is concealed within the drum; *d*, tube with stop-cock; *f*, drum in which the excess of spray is condensed; *g*, the waste tube to carry off the condensed fluid; *h*, the manometer.

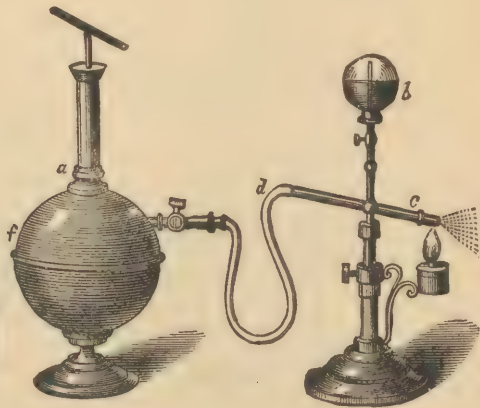


FIG. 39.—Mathieu's Néphogène (Cohen). *a*, the compression pump; *b*, glass globe containing fluid to be nebulized; *c*, the exit tube; *d*, flexible tube conveying condensed air from the reservoir to the exit tube; *f*, air reservoir.

being applied to the distal bulb as shown in Fig. 40, while the central bulb acted as a sort of reservoir. This device was subjected to various modications until finally Dr. Sass, of New York, constructed the atomizing tubes generally known as Sass's tubes. These are made on the Bergson principle, and of heavy barometer glass tubing, but instead of placing the two tubes at right angles, they are joined together, the upper end of the water tube being

<sup>1</sup> *Gaz. Hebdomadaire*, May 4th, 1860, p. 300.

<sup>2</sup> *Deut. Klin.*, 1863, No. vii.



bent at its upper extremity around to meet the air current at a right angle, as shown in Fig. 41. Subsequently these tubes were

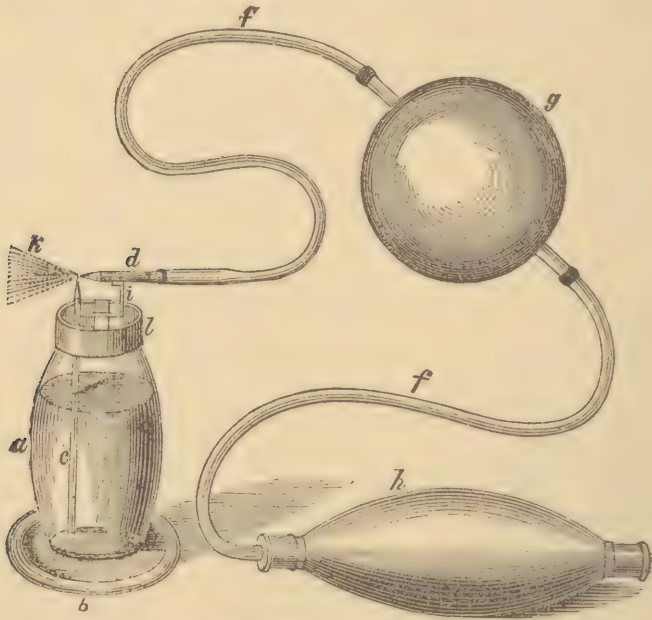


FIG. 40.—Bergson's Apparatus with Foot Bellows (Lewin). *a*, Reservoir for fluid; *b*, a tray; *c*, vertical tube; *d*, horizontal tube; *f*, flexible tubing; *g*, air reservoir; *h*, rubber compressor to be compressed by the foot; *i*, joint connecting the tubes; *k*, the spray; *l*, the cap of the reservoir to which the tubes are attached (Cohen).

constructed of hard-rubber and metal. An objection to metal is made, that it is liable to the action of the chemical agents used—an

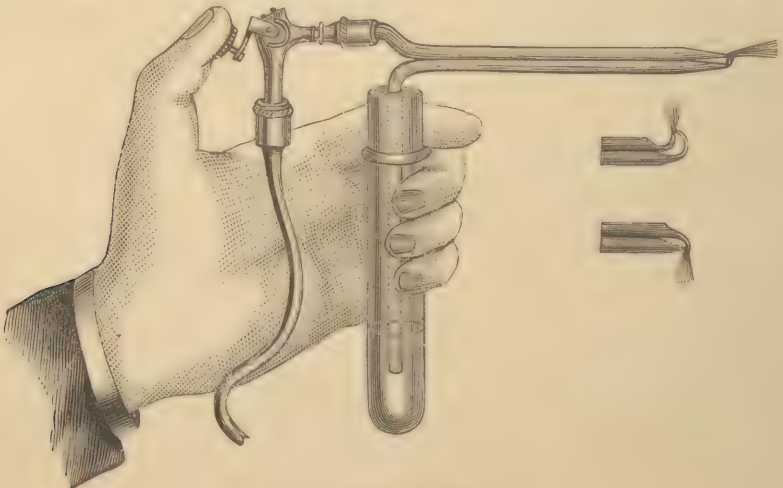


FIG. 41.—Sass' Spray Tube.

objection which is easily obviated by attention to cleanliness, while at the same time a large element of loss by breakage is also avoided by their use. Dr. Newmann, of New York, modified the Bergson tubes by placing one tube within the other, as shown in Fig. 42, the principle on which they act being the same as in Bergson's.

Previous to this, Manz<sup>1</sup> had made a somewhat ingenious change, consisting of the introduction of a third tube, passing through the cork of the reservoir bottle in such a way that air from the bulbs was forced both into the tubes and into the reservoir, thus driving the fluid up into the tube to meet the air current.

Dr. Richardson, of London, combined the Newmann and Manz

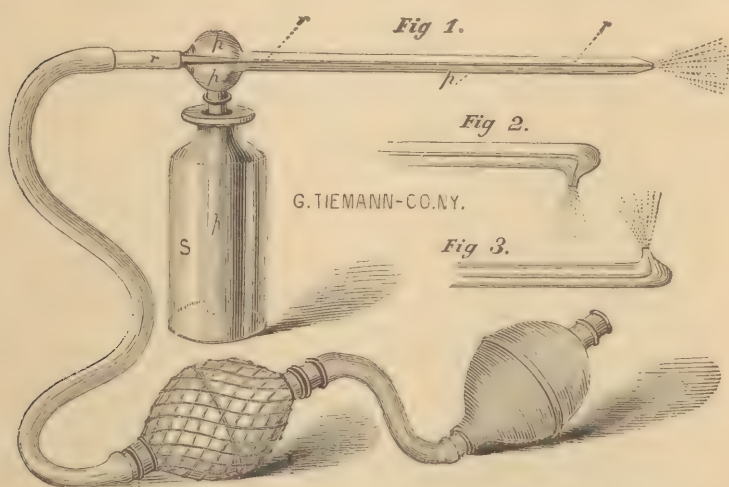


FIG. 42.—Newman's Spray Tubes, Worked by Means of the Double Bulbs.

devices into what is ordinarily known as the Richardson spray, in which the projecting portion consists of two hard-rubber tubes, one within the other. To the outer tube is fitted, at its distal extremity, a movable cap, perforated in its centre by a small opening. The inner tube passes from immediately behind the opening in the cap, through the centre of the outer tube, through the neck of the reservoir, and down into the fluid. The small projecting nipple on the neck of the bottle or reservoir is for the attachment of the air-bulbs which furnish the air pressure. It opens into the larger tube, and also communicates with the reservoir. As will be seen, when a current of air is pumped in by the bulbs, it is divided into two streams. One stream passes into the reservoir above the fluid, where, being compressed, the fluid is forced up through the central

<sup>1</sup> Deut. Klin., 1866, p. 224.

tube and driven in a small jet against the opening in the movable cap. The other current from the air-bulb passes into the larger tube, and escapes through the opening in its movable cap. The small jet of the fluid striking against the edge of the small opening in the cap, and at the same time meeting with the current of air

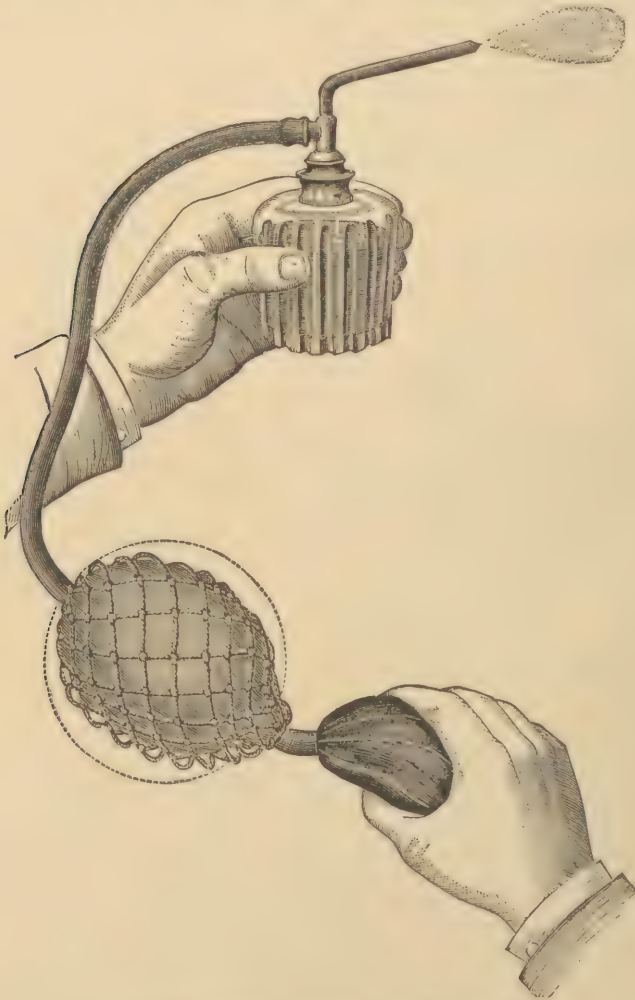


FIG. 43.—The Richardson Double-bulb Hand Atomizer (Seiler).

escaping therefrom, is broken up into a fine spray, and in this state is carried with the current some distance beyond the tube. A separate movable cap is ordinarily supplied, fitted with a tip, curved in such a manner as to deflect the atomized fluid either upward or downward. This apparatus is shown in Fig. 43. We thus have

illustrated two principles upon which all atomizers are constructed in our day—that of Bergson and of Richardson.

The air-current may be supplied by means of the rubber bulbs or by more elaborate devices. The Richardson atomizer is usually provided with a double bulb. This, I think, is an entire mistake, as the principle upon which the atomizer is constructed gives a continuous atomization by the one bulb, while at the same time it forces the spray much better when the pressure of the hand on the single bulb is the motive power, rather than the contractile force of the central rubber bulb which is usually in-

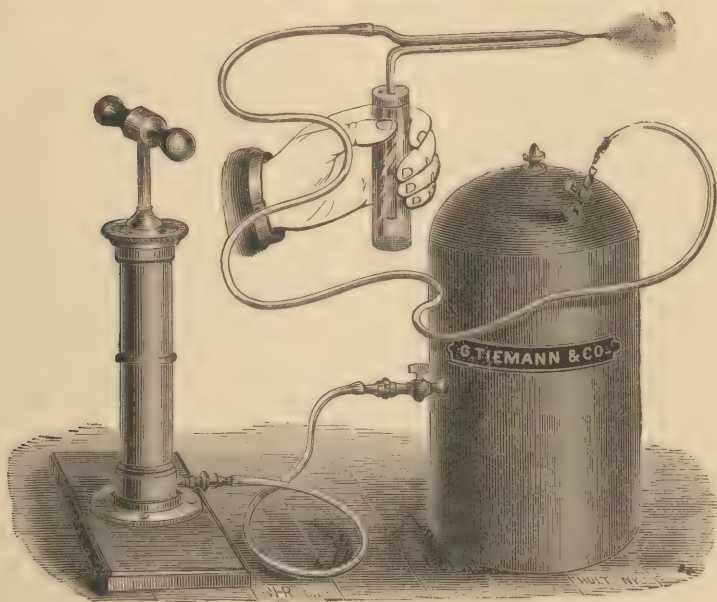


FIG. 44.—The Ordinary Hand-pump and Air Receiver.

troduced in the continuity of the tube. In the use of the Sass' tubes, a simple hand-ball, ordinarily, is insufficient, hence the compressed air apparatus so much in vogue of late years has been introduced. This consists simply of a pump and air receiver, as shown in Fig. 44, the cylinder being charged with air by means of the pump, which is then drawn off as wanted for the production of the sprays; the advantage of the air receiver being that the force of the spray can be regulated with a certain degree of nicety, while the jet is delivered instantly upon turning on the pressure, and arrested instantly upon its being shut off. The charging of the air receiver by the small pump shown above involves no small amount of laborious exertion. This is to an extent avoided by



the instrument shown in Fig. 45, in which the pump piston is worked by means of a heavy fly wheel. Of course, all this labor is saved by the substitution of hydraulic pressure, as was first suggested by Dr. Arnold of Roxbury.<sup>1</sup> He makes use of two jars, connected by a piece of long rubber tubing, one jar being filled with water, while the other is empty. By raising the full jar to a certain height, the water flowing into the empty one pro-

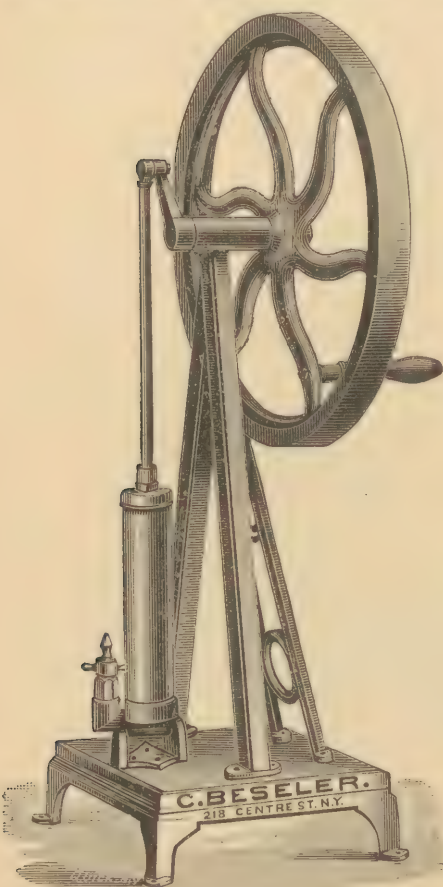


FIG. 45.—Air Pump Worked by Fly-wheel.

duces compression of the air there contained, which is available for use until the air is exhausted and the jar is full of water, when the process is reversed. A continuous supply of air is thus obtained by the alternate use of one jar and then the other, the atomizing tube being connected with the lower jar. No apparatus yet devised, perhaps, is more convenient for use than the hydro-pneumatic pump, shown in Fig. 46, which is worked by the ordinary city water supply. It consists of a metallic box into which water runs from the public main. As soon as the box is filled, by means of a simple mechanism in its upper portion, the supply is shut off and a waste valve opened, which, in turn, is closed as soon as the box is empty, and the water supply turned on again. We thus have the water-head acting as a piston-head and pumping air through the tube, shown in the figure,

into the air receiver, and storing it for use. This pump continues working until the air-pressure in the receiver equals the water-pressure in the supply pipes of the house. It is an excellent device, and will work for weeks and even months without requiring attention.

A great deal of ingenuity has been exercised in the construction of these various devices for atomizing fluids, and it has been a

<sup>1</sup> Boston Med. and Surg. Journal, Dec. 27th, 1866.

broadly prevalent impression that our success in the treatment of diseases of the upper air-passages was largely dependent upon the elaborateness and perfection of our mechanical devices, especially those used for the production of sprays. Furthermore, a good deal of importance has attached, in the minds of many, to the pressure of the air by which the fluids are atomized, the ground being taken that at a pressure of fifty or sixty pounds atomized fluids come more thoroughly in contact with the membrane lining the sinuous passages of the nose, and are so driven farther down into the bronchial tubes, the idea still being held that local applications constitute the essential element necessary for the cure of catarrhal diseases. This I believe to be an entire mistake. A catarrhal inflammation, as a rule, is not cured by the local application of

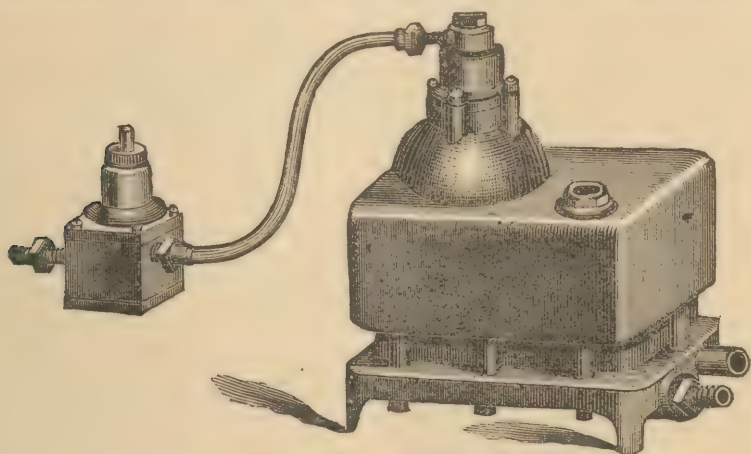


FIG. 46.—The Hydro-Pneumatic Pump.

astringent, alterative, stimulant or other remedies, as will be more fully elaborated when we come to discuss the particular forms of inflammatory disease met with in the upper air tract. Local applications undoubtedly have done good; they are convenient for cleansing purposes possibly, and astringent applications in the nose or larynx aid us somewhat in the treatment of catarrhal inflammation of these regions, and we cannot well dispense with them, but I am confident that those who place their main reliance on the use of sprays will find themselves disappointed in the results of treatment. Elaborate apparatus is unnecessary. I have always entertained the opinion that all the apparatus necessary for the successful treatment of the ordinary class of cases which come under our observation might easily be carried in a small hand-bag. Regarding, then, an atomizing apparatus as a very great convenience, although not an absolute essential, it remains to suggest that perhaps

the most convenient device is the ordinary Sass's tube, constructed of metal, with the air receiver and pump, preferably the water pump if one's office is supplied with the public water service; but



FIG. 47.—The Ordinary Single Bulb, Hand Ball Atomizer, fitted for Nasal Applications.

this apparatus possesses no notable advantages over the simpler devices. In my own office work, after an experience of many years with various methods of atomization, I have finally arrived at the conclusion that one's work can be quite as well performed, and much inconvenience even avoided, by using an ordinary single bulb hand-ball atomizer. Of these, perhaps the best is that shown in Fig. 47, which is constructed on the principle of Richardson's atomizer. The device shown is fitted with a rounded bulb to



FIG. 48.—Delano's Atomizer.

adapt it for nasal application, although the same instrument is supplied with both the laryngeal and post-nasal tip. This instrument is used, in the main, to apply cleansing and disinfecting lotions to the upper air passages, and delivers an abundant, yet finely divided spray. For making applications of astringent, sedative, or other medicating solutions, preference should be given to some of the atomizers constructed on the

Bergson principle. In Fig. 48, there is shown an atomizer, constructed on this principle, and sold in the drug stores under the



name of Delano's Atomizer, which delivers a very fine spray, the flow of which ceases immediately upon relaxing the pressure upon the bulbs; it is therefore useful in making applications of cocaine, and for this purpose I regard it as of especial value.

### INHALATIONS.

In 1864 Siegle<sup>1</sup> put in practice the plan of using steam as the power by means of which fluids were atomized in the Bergson tubes. This, however, was not available for a direct application, but could only be used as an inhalation, and it is this principle which is made use of in the ordinary steam atomizers sold by the instrument makers at the present day. The principle on which they act is too well known to need remark. The drugs that can be made use of by means of the Siegle apparatus include nearly the whole list of astringents, alteratives, etc. In addition to these, there are certain drugs which contain principles which are volatilized when brought in contact with hot water at a temperature of not less than 150°. This list includes carbolic acid, creosote, camphor, oil of tar, tincture of benzoin, tincture of myrrh, oil of eucalyptus, terebene, pine-needle oil, ethereal tincture of iodine, etc. A teaspoonful of any of the above, placed in an open-mouthed bottle or cup containing half a pint of water slightly below the boiling point, is placed beneath the mouth, and the fumes inhaled. The same purpose is accomplished in the somewhat elaborate instrument known as Mudge's inhaler, in which an inhaling tube is inserted into the cup, in such a way that the inhaled air is drawn through the fluid. In MacKenzie's inhalator, shown in Fig. 49, and instruments of that type, the volatile oils of the medicament used are driven off more actively by means of a burning lamp placed beneath the reservoir or cup.

There are quite a number of drugs which are volatile at the ordinary temperature, the properties of which, as inhalants, possess a certain amount of value. The method by which these are used

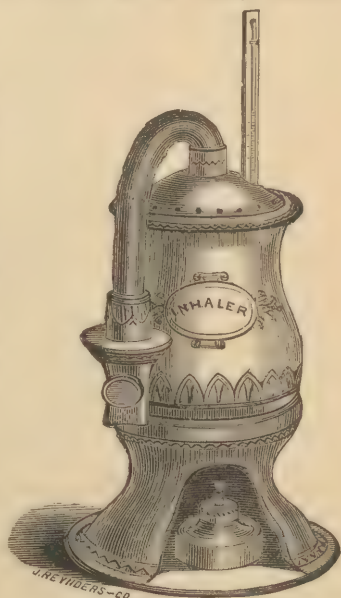


FIG. 49.—MacKenzie's Inhalator.

<sup>1</sup> "Die Behandlung und Heilung der Hals- und Lungenleiden durch Einathmungen mittelst eines neuen Inhalations-Apparates," Stuttgart, 1864, p. 16.



varies, but ordinarily is quite simple. A glass or vulcanite tube, into which has been inserted either cotton-wool or sponge, is the ordinary form. The absorbent material is charged with the drug which it is desired to use, and the little tube held either to the nostril or to the mouth, for the purpose of inhaling the fumes. In this way we make use of iodine, creosote, ammonia, oil of tar, oil of peppermint or any of the mint series, and, in fact, most of the aromatic oils. Lewin has suggested a rather ingenious device, by which nascent muriate ammonia is used for inhalation. His apparatus, shown in Fig. 50, consists of three flasks, one containing a solution of caustic ammonia, the second a solution of muriatic acid, the two being connected by means of glass tubes with a third flask, partially filled with water, to



FIG. 50.—Lewin's Apparatus for Inhaling Nascent Muriate of Ammonia. *a*, Glass vessel, containing strong aqua ammonia; *b*, glass vessel containing muriatic acid; *c*, glass vessel containing distilled water, slightly acidulated; *d*, rubber tubing, to which is attached the mouth-piece; *e*, *f*, connecting glass tubes; *g*, *h*, glass tubes for admittance of atmospheric air.

which is attached the inhalation tube. When the air is drawn through the third flask, it draws fumes from the first and second flasks containing muriatic acid and ammonia, which, meeting in the third flask, give rise to the fumes of nascent muriate of ammonia. This apparatus is oftentimes of no little use in the later stages of a winter cold or a bronchial attack, in stimulating the membrane to freer transpiration, and thereby promoting a resolution of the inflammatory process.

Too much value should not attach to the use of inhalations, in the various forms of acute inflammation which involve the upper air passages. They undoubtedly serve to relieve pain, and perhaps to mitigate the severity of the attack. Certainly, they add much to the comfort in relieving the irritability of the parts, and lessening the severity and frequency of the cough.

On the whole, however, inhalations are to be regarded largely as palliative measures. The elaborate apparatus for inhaling purposes may serve to produce a certain moral effect upon the patient, but I doubt if the action of the drug is not quite as efficacious in the simpler devices suggested above, as in the more elaborate inhaler. The steam atomizer, while a somewhat entertaining toy,



FIG. 51.—Large Globe Inhaler for Inhaling Fluids Atomized by means of Compressed Air.

I have long ago discarded, on the ground that it not only accomplishes little good, but is capable oftentimes of doing mischief. Especially is this true in all forms of chronic disease of the air passages, in that the hot steam, I think, serves to so far relax the parts as to largely counteract all good that may be accomplished by the medicament used. Indeed, none of the above methods of inhalation are to be used in chronic affections, unless, perhaps, the

muriate of ammonia, which oftentimes serves to loosen the thick inspissated mucus of a chronic bronchitis.

Cold inhalations, by means of compressed air in the atomizer, have been, in the past few years, largely resorted to in the treatment of chronic affections of the upper air passages. The method by which they are administered is to direct the spray into one end of a large globe, while the patient, sitting in front of the opposite end, draws the atomized fluids into the air passages. The principle of its action is that the large particles of atomized fluids are arrested in the globe and fall to the sides, while the finer particles of the spray are carried to the air passages by the inspiratory act. The drugs used in this way embrace nearly the whole list of astringents, alteratives, etc., which are supposed to possess a certain amount of controlling influence on catarrhal processes. This is undoubtedly a valuable method of applying astringent remedies directly to the upper air tract, and in those cases where the inflammatory process has invaded the larger bronchial tubes its use is attended with better results than any other device which we possess. Certainly, it is far preferable to hot inhalations, either by means of the steam atomizer or the ordinary inhalator. In Fig. 51 is shown one of the more elaborate forms of the globe inhaler.

## CHAPTER III.

### MUCOUS MEMBRANES.

A MUCOUS membrane practically resembles very closely the external integument, but so modified as to adapt it for the special purpose which it is designed to serve in the economy, viz., to afford a proper lining for the various passages and cavities of the body which communicate with the external world; for, as we know, all these cavities, such as the genito-urinary passages, the alimentary canal, and the respiratory tract, are lined with a membrane of this kind. In order to adapt it for the special purpose which it is designed to subserve as a lining membrane for these cavities, it becomes essential that it should be soft, moist and pliable, and moreover that it should be endowed with an apparatus for maintaining this soft, moist, and pliable condition; for, as we know, in many of the cavities of the body, especially the air tract, the conditions are such that this soft, moist, and pliable condition would be destroyed, were it not that the membrane contains within itself some apparatus for supplying the conditions necessary to counteract this tendency. Hence, for this purpose, we find the mucous membrane covered with epithelial cells of various characters and arranged in various ways, according to the location and special function which it subserves; the object of the epithelial cells being merely the secretion of mucus. In these tissues, we may regard each individual cell as a typical gland, displayed over the surface of the mucous membrane, whose object is to keep the membrane softened and moistened. In fact, nature endows the membrane, in this manner, with its own lubricating apparatus. It is found, however, that epithelial cells simply displayed in layers on an unbroken surface are unequal to the demand. In other words, distributed in this manner, they are not equal to supplying a sufficient quantity of mucus for lubricating the passages. To remedy this deficiency, nature resorts to a very simple device for extending the secreting surface. This consists in folding the membrane upon itself, as it were, or in other words, bending it down into the tissues and back again, to form a small flask-like cavity which is called a follicular gland. In other cases, instead of forming a straight fold, the pouch-like cavity of the simple follicle is folded on itself a number of times, forming



a group of small flask-like pouches, as it were, which uniting, open upon the surface by a single orifice, thus constituting what is known as a racemose gland. The arrangement of glands and follicles in the mucous membrane, therefore, I take it, are for the purpose of enlarging the surface over which the epithelial cells may be distributed, and, therefore, increasing the secreting power of the membrane, in order that its surface shall be constantly supplied with an abundant quantity of mucus, the normal lubricant of the membrane. This, then, briefly and simply stated, is the design and function of a mucous membrane, a proper understanding of which is of the greatest importance to the proper appreciation of diseased conditions of the upper air tract. A mucous membrane, wherever

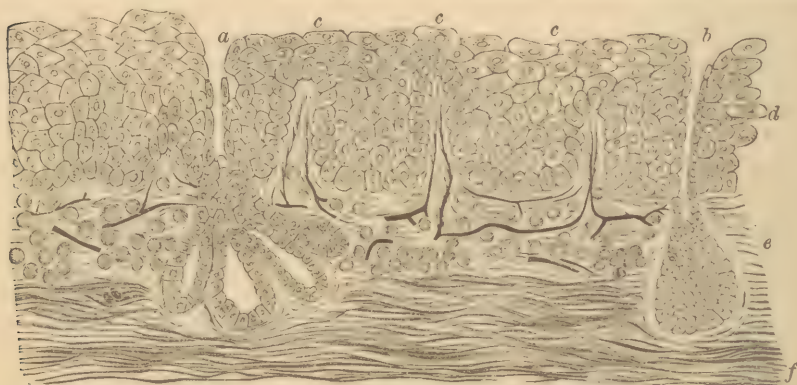


FIG. 52.—Section of Mucous Membrane, drawn Diagrammatically. *f*, Submucous layer of connective tissue; *d* and *c*, mucous membrane proper, containing blood vessels, nerves, closed follicles, connective and elastic tissues fibres, and marked by villi; *c*, epithelial layer; *b*, simple follicle; *a*, racemose gland.

met with, is much the same thing, its function varying simply with the conditions and environment in which it is placed. Its function in the economy is largely complete when it has provided the cavities of the body with a proper lining. Any other functions which it performs are mainly adventitious.

#### ANATOMY.

From an anatomical point of view, we describe a mucous membrane as composed of three layers.

First, a superficial layer, composed of epithelial cells.

Second, the mucosa proper, a layer composed of white fibrous and yellow connective elastic tissue, embracing within their meshes blood-vessels, smooth muscular fibres, different varieties of small glands, and presenting minute processes or villi.

Third, an external layer of loose connective tissue; the submucous cellular tissue (see Fig. 52).

*First. The epithelial layer.*—An epithelial cell, the typical or elemental gland, is simply a soft rounded cell, containing a nucleus and cell contents, pellucid or granular, and all contained in a cell wall, whose varying shape gives to it its name; such as: 1. Pavement or tessellated epithelium, so called from their being pressed down and flattened from above, and crowded together in such a manner as to give an angular outline to each cell. 2. Columnar epithelium: elongated cells with rounded or square ends. 3. Columnar ciliated epithelium: the same shaped cell as the columnar, but endowed with fine hair-like processes on the free end, which possess the power of vibratory motion. 4. Squamous epithelium: worn out or dried cells, which are thrown off from the surface.

These cells may be arranged in a single layer, or in several layers, one above the other; this latter arrangement is generally found in mucous membranes, in two varieties.

*a. The laminated pavement.* Commencing with the elongated or columnar cells beneath, and becoming rounded above, until they reach the surface, where they become of the pavement variety. This arrangement is found in the lower portion of the pharynx, and in the œsophagus.

*b. The laminated ciliary.* Commencing with rounded cells below, which, becoming elongated as they approach the surface, show on the upper layer the columnar ciliated cells. This variety is found in the lungs and air passages, except the smaller bronchi.

*Second. The mucous membrane proper.*—Beneath the epithelial cells is found the mucous membrane proper; composed, as stated, of connective tissue, elastic tissue, muscular fibres, glands, blood-vessels, and nerves, and marked by minute processes or villi.

*The connective tissue* which is found in this layer is composed of fine fibrils united into bundles by a small quantity of a clear connecting substance, and forms a close network or an almost homogeneous membrane. In this connective tissue we find certain cells, resembling the white corpuscles of the blood, the so-called leucocytes. This is the connective-tissue corpuscle, or, as it is sometimes called, the migrating corpuscle, and again, the amœboid cell, from its observed power of motion. This cell performs an important part in inflammations, not only of mucous membranes, but of other tissues, as will be noticed further on. *The elastic tissue*, one of the elementary structures of the body, is displayed more or less freely throughout this layer, and is composed of simple thread-like fibrils, crossing and interlacing in every direction. It is of a yellow color, and possesses a high degree of elasticity.

*The muscular fibres* are of the unstriated variety, and are very sparsely distributed through the layer.

*The glands* are of two varieties, the simple follicular gland, and the compound follicular or racemose gland. The simple follicle is merely an infolding of the membrane into a straight tube, or flask-like cavity. The racemose gland is composed of a cluster of flask-like follicles, opening into a single duct, whose orifice is upon the surface of the membrane.

*The vessels* are very numerous, and form close meshes in the membrane proper, sending a loop into the smaller villi, and into the larger, a close network.

*Third. The submucous cellular tissue.*—This is composed of a more or less loosely connected network of connective tissue, by which the mucous membrane is attached to the parts beneath, and, of course, allows of a very free play between the membrane and these parts. This fact becomes of extreme importance in connection with acute inflammatory affections of the membrane, as it admits of the effusion of serum into this layer, where its attachment is very loose, as in the ary-epiglottic folds of the larynx, the posterior surface of the epiglottis, and the ventricular bands.

#### PHYSIOLOGY.

The function of a mucous membrane is to afford a soft, moist, and pliable lining to those cavities and passages of the body which communicate with the external world. It is lubricated by a clear fluid mucus, which is poured out upon it by the follicular and racemose glands, whose ducts open upon its surface, and also by the epithelial cells which compose its superficial layer, each epithelial cell being in its small way an independent and secreting gland.

Owing to the constant mechanical disturbance to which the membrane is subjected in mastication, speaking, etc., the cells of its superficial layer are being constantly detached and thrown off. In order to compensate for this loss, new cells are being continuously generated from below. The method by which this is accomplished is exceedingly simple, and may be explained by a very brief reference to cell pathology. Virchow first advocated the doctrine, some twenty years ago, which now meets with general acceptance, that every cell grows from a parent cell; and in no department of histological study is the observation more clearly confirmed than in that of mucous membranes. The method of cell-development is probably by one of three processes:

1. *Division.*—A constriction develops across the centre of a cell which, becoming narrower and of an hour-glass shape, finally separates, and in place of one cell two cells exist.



2. *Gemmation*.—In this process, there appears at some point in the cell-wall a small projection, which protrudes more and more, while its attachment to the parent cell becomes narrower, and finally it drops off, a newly developed cell.

3. *Endogenous growth*.—A new cell is developed inside the parent cell, as the foetus in the mother's womb; and finally, when it has attained maturity, it bursts its wall and escapes.

It is by one of these processes that new cells are being constantly generated in the deeper layer of the epithelial coat of the membrane, to make good the waste which is constantly going on at its surface.

Another physiological characteristic of mucous membranes is their permeability, by which fluids may penetrate them from without, and become absorbed by the blood-vessels, or perceived by the nerves. The activity of this function depends mainly on the thickness of the epithelial coat, thus where this is very thin, as over the papillæ of the lips and the tip of the tongue, we find the sensitiveness very acute. An exception to this rule is found in the fact that the virus of the snake does not permeate mucous membranes, and is in no way absorbed by them, it being necessary that it should meet with an abraded or cut surface, in order to reach the blood-vessels, and be taken up by them. The same is true of the syphilitic virus, which is only inoculable through an abrasion of the membrane.

#### INFLAMMATION OF MUCOUS MEMBRANES.

Inflammation is that series of changes which takes place in any tissue as the result of an injury, provided the injury is not of such a character as to completely destroy its vitality. This injury may be a direct irritation of the tissue by a mechanical or chemical agent, or by substances carried to it by the blood, or it may be an indirect irritation, as is the case in inflammation of internal organs, as the result of exposure to cold.

Through the researches and experiments of Cohnheim, Stricker, Burdon-Sanderson, and others, the nature of these changes is well known. The process comprises:

1. Changes in the blood-vessels and circulation.
2. Exudation of liquor sanguinis, and migration of white blood-corpuscles.
3. Alteration in the nutrition of the inflamed tissues.
  1. The first effect of an irritation of the tissues is to cause dilatation of the arteries, followed soon by dilatation of the veins. The dilatation is also attended by an increase in the length of the vessels, and they become more or less tortuous.



The enlargement of the vessels is attended, at the outset of the process with an acceleration in the flow of blood, but this is soon followed by a retardation of the flow, the vessels remaining dilated. As the circulation becomes slower, the white corpuscles, or leucocytes, accumulate in the veins, and their natural tendency to adhere to the sides of the vessels is increased to such an extent that they nearly fill the calibre of the tube, and accumulate against its walls, remaining almost stationary, while the blood-current passes by them, though with a greatly diminished velocity. Those immediately in contact with the wall of the vessel are now seen to press against it, and finally to pass through into the tissue beyond, simply transuding the wall, the opening closing up behind them.

2. Associated with the passage of the blood-corpuscles is the exudation of liquor sanguinis. This exudation, which constitutes the well-known inflammatory effusion, differs from the effusion which escapes from the blood-vessels in simple mechanical obstruction, as in dropsy from heart disease or cirrhosis, in containing an amount of fibrin and albumen, varying with the extent and severity of the inflammatory process.

3. The remaining constituent of inflammation is the alteration in the nutrition of the inflamed tissue. The cells which constitute a normal part of the tissue take on an increased activity; the normal processes of physiological growth become greatly exaggerated, and new cells are developed by one of the methods before alluded to.

This, in brief, completes the picture of inflammation in general. Confining ourselves now to mucous membranes, we find certain peculiarities manifesting themselves in the processes.

Inflammation of mucous membranes occurs in three different varieties: catarrhal, croupous, and diphtheritic.

*Catarrhal inflammation.*—This is by far the form most frequently met with. In its milder degrees it is characterized merely by an increased secretion of mucus. An increased flow of blood to the parts, occurring at the outset of the process, seems to stimulate the cell-elements to an abnormal activity, in which new cells are generated; the glands pour out their normal secretion in excessive quantities; an abundant liquor sanguinis transudes the vessels; and the result is an increased secretion of mucus, which is highly charged with young cells, many of them having their source within the epithelial cells, while others are emigrant blood-corpuscles. The membrane at the same time becomes swollen and reddened, as the result of the increased vascularity.

If the irritation be more severe, the vascular phenomena are more marked; the cell-generation is more rapid; and as the result of this rapid generation they seem to fail of attaining maturity, and

are poured out in an unripe state; hence they are smaller, and not so well developed. Many of these imperfectly developed cells cannot be distinguished from pus-corpuscles; while others are larger, and resemble the mucus-corpuscles or leucocytes. Between the mucus-corpuscle and the pus-corpuscle we have no method of distinguishing, except that the former is larger, and of a somewhat more regular outline. The epithelium also loosens, and falls off more rapidly from the surface of the membrane, under the stimulus of the inflammatory process; and as it progresses we have the mucous discharge gradually becoming a purulent one, from being so highly charged with these unripe cell-elements, many of which are virtually pus-cells.

The process continuing, its activity, which so far has been largely confined to the superficial layer of the membrane, extends to the sub-epithelial layer, or the mucous membrane proper, which now becomes more involved, and the cell-elements here take on renewed activity, and becoming rapidly generated, they distend and infiltrate the parts. The membrane becomes thickened and more swollen; and there now may occur several secondary manifestations of the inflammatory process. As the result of the loss of surface epithelium, the membrane may become denuded of its epithelial coat, and there may occur an abrasion, or so-called catarrhal ulcer. As the result of the distention and infiltration of the membrane proper, the glands may become so choked that their contents are imprisoned, and as the result, there is formed a minute abscess, which breaking and discharging, there is left a small ulcer. The acute process may subside, or it may lapse into the chronic state. In this, the increased vascularity subsides to an extent, though the vessels remain permanently somewhat dilated. The cell-production, however, goes on both in the epithelial layer and in the mucous membrane proper; and the increased secretion persists; but all in a somewhat diminished degree.

Chronic catarrh differs from acute catarrh in that in the former the sub-epithelial layer of the membrane is much more involved. It is thickened and indurated by its infiltration with the young cells before spoken of, the mucus-corpuscles, and migrating blood-corpuscles; and also by a renewed activity in another elemental tissue of the membrane, viz., the connective tissue, which plays an important part in chronic inflammation. This tissue is developed now by a slow process of proliferation, and by its peculiar characteristics gives rise to those features of chronic catarrh which render it extremely obstinate to manage.

Having been once developed, it is probable that connective tissue is never absorbed or excreted as the other cell-elements in

catarrh; but becoming organized, it remains a permanent element in the membrane to deform, disorganize, and interfere with its proper function. As the result, then, of the new deposit in the membrane, we may have its normal thickness so much increased as not only to interfere with its proper function, but also to impair by mechanical means other functions; as in the hypertrophied membrane of the nose, causing nasal stenosis, and thereby interfering with normal nasal breathing. Again, this tissue may be so deposited as to press upon the glands and follicles of the membrane in such a manner as to cause their atrophy, thus robbing the membrane of its proper supply of lubricating fluid, its mucus, and giving rise to the so-called dry catarrh. It may be deposited about the individual follicles or glands in such a manner as to press upon the outlet alone, thus closing them up, giving rise to small cysts; or their contents becoming imprisoned, undergoing fatty degeneration, and acting as a renewed source of irritation, there may occur a glandular hypertrophy of an individual follicle or gland, giving rise to the so-called follicular inflammation.

In addition to this, we notice a tendency in chronic processes to differentiation, by which in the one case the morbid process expends itself upon the epithelial and lymphoid structures, while in the other case it acts upon the connective-tissue elements of the membrane. Thus, in the former we may have a chronic catarrhal inflammation in which a rapid degeneration of epithelial cells occurs in such a manner as to increase to a very large degree not only their growth, but their loss from the surface, giving rise to a form of secretion from the membrane in which a large amount of mucus is thrown off, heavily surcharged with unripe epithelial cells, causing muco-purulent discharge. Thus, in the purulent rhinitis of children, to be described later, the essential lesion consists in an intense activity in the epithelial structures. Again, we may have the same activity in the lymphoid cells giving rise to a formative inflammation, as it were, in which the lymphoid cells are rapidly generated and remain a portion of the membrane, instead of being thrown off in the form of a purulent discharge. A lymphoid hypertrophy is the result of this form of catarrhal inflammation, such as is met with in adenoid disease of the vault of the pharynx, or hypertrophy of the faucial tonsil, or enlargement of the follicles of the lower pharynx. Activity of morbid processes confined largely to epithelial and lymphoid structures, belongs essentially to the younger period of life, the diseases above referred to, it will be noticed, being all of them diseases of youth and childhood. The morbid activity in the connective-tissue structures, on the other hand, belongs essentially to later life, hence a chronic inflamma-



tion of the mucous membrane, resulting in a connective-tissue hypertrophy, such as in hypertrophic rhinitis, is essentially a disease of adult life. This is due probably to the fact that the development and ripening, as it were, of a connective-tissue cell is a process of years, and that a true connective-tissue hypertrophy can only exist after a catarrhal inflammation has been in operation for a long period of time.

*Croupous Inflammation.*—This form of inflammation is of a higher grade, and of a more intense form than the catarrhal; for while it commences in the same manner, with distention of the blood-vessels, escape of liquor sanguinis and blood-corpuscles, and proliferation of cells, it differs from it in the fact that the exuded liquor sanguinis contains a large amount of fibrin and albumen, which coagulates upon the surface of the membrane, and forms a false membrane. This false membrane is of a more or less dense, firm character, and is composed of fibrin, inclosing a large number of epithelial cells in its meshes. At times it may be soft and almost granular in character, so much so that it may be easily removed with a soft brush, coming away in small broken particles. At other times it may be of so dense a character that after removal it can be torn only with considerable force. As a rule it can be easily removed, leaving the membrane beneath it in the main intact, merely deprived of some of its superficial epithelial cells. After removal, the same process may be renewed, and a new membrane form, or the parts may be restored to their normal condition.

The favorite site for this form of inflammation is in the upper air-passages, the pharynx, tonsils, larynx, and trachea, though it may occur in the bronchi, intestinal canal, and other parts.

Why this form of inflammation occurs, it is impossible to state; but it is not improbable that it is due to some previously existing blood condition, which dominates the inflammatory process, and so far enriches the exuded liquor sanguinis with the fibrinous material, that it coagulates on its exposure to the air, and so a false membrane is formed, in place of the fluid catarrhal discharge. Further evidence that this form of inflammation is due to some previous condition in the blood, is afforded by the fact that its onset and course are usually marked by a febrile movement, far more aggravated in character than we would expect to find as merely symptomatic of so limited an extent of local inflammation. The temperature in simple membranous sore throat, characterized by a croupous deposit on the tonsil, often ranges as high as  $103^{\circ}$ – $104^{\circ}$ .

Croupous inflammation may manifest itself in a fibrinous exudation on the surface of a mucous membrane, as in croupous laryngitis, or true croup, membranous sore throat, croupous rhinitis,



etc.; or the exudation may take place in the follicles of the membrane, giving rise to an acute follicular inflammation, such as occurs in the affection generally known as acute follicular tonsillitis, which is a croupous inflammation of the tonsil, in which the exudation takes place in the crypts of the organ, rather than upon its surface.

*Diphtheritic Inflammation.*—This variety of inflammation, again, is characterized by the formation of a false membrane, and also commences as a catarrhal inflammation, with its increased blood flow, cell proliferation, and exudation of liquor sanguinis, the exudation, as in the croupous form, containing largely of fibrin and albumen; but there is this difference, that while in the croupous form the exudation is poured out upon the surface of the mucous membrane, in the diphtheritic form it permeates and infiltrates its whole thickness, down to the submucous tissues.

This exudation permeates the membrane so densely that in coagulating it completely destroys its vitality, and there results a dead membrane, involving the whole thickness of the mucous membrane. It is removed with considerable difficulty; and in its removal, carrying with it the whole thickness of the membrane, leaves the parts beneath entirely denuded. The false membrane declares itself to the eye as a dead membrane, a genuinely necrosed or sloughing tissue, of a dark grayish color, resembling boiled macaroni; in contradistinction from a croupous membrane, which is of a bluish, pearl-gray color, presenting no appearance of necrosis, but rather of an unmistakably living tissue.

It should be understood, in regard to these terms, croupous and diphtheritic inflammation, that they only refer to forms of inflammation to which mucous membranes are subject, and not to the specific diseases which are spoken of under the names croup and diphtheria; as, for instance, membranous croup is generally understood to be a croupous inflammation of the mucous lining of the larynx, although a better classification would suggest the more expressive and correct name of croupous laryngitis; and also of diphtheria, it is a blood disease, characterized by a local manifestation in the throat, consisting of an acute inflammation of its mucous membrane, which assumes the diphtheritic form; so that when we speak of croupous and diphtheritic inflammation, we simply define the form which the inflammatory process assumes.

In regard to catarrhal inflammation, or as it is generally called, catarrh, the same may be said; properly speaking, it means that form of inflammation of a mucous membrane which is characterized by an excessive discharge of mucus or muco-pus; but a better usage in the direction of an exact classification, would suggest that the local designation should be prefixed, as nasal, laryngeal, bronchial catarrh, etc.

## CHAPTER IV.

### TAKING COLD.

ALTHOUGH this is one of the commonest and most familiar of phenomena, both as a matter of clinical observation and of personal experience, if we ask ourselves what especial influences produce the morbid changes which we call taking cold, or what is the true relation between the recognized causes and observed effect, we find it somewhat difficult to give a correct answer to the question.

Among the numerous theories advanced, may be mentioned that of Rosenthal, who asserts that the immediate effect of cold, acting on the surface of the body, is to excite contraction in the peripheral vessels, by which the blood is driven from the surface, in upon the internal organs, and acts there as an irritant, exciting inflammation. This view of the matter is somewhat mechanical, and scarcely explains the action of cold in many instances. Not infrequently, as the result of an exposure, it is not really internal organs that become the seat of the consequent inflammation, as an attack of acute eczema, or acute conjunctivitis, may follow; or, as in the case of the commonest of all inflammatory affections resulting from exposure, an attack of acute coryza, a membrane so near the surface is involved that, under the action of Rosenthal's theory, the blood should, to an extent at least, be driven from the membrane, rather than that it should be flushed upon it from without. Furthermore, as we know, mere mechanical congestion does not lead to true inflammatory action, as shown by the old familiar and often repeated experiment of ligating the efferent veins of the frog's foot, and observing the result in the web under the microscope. It must be borne in mind that a cold does not result from a low temperature; in other words, *absolute cold* and *taking cold* are two entirely distinct expressions.

A far more plausible view of the matter is that of Seitz. His theory is that disorders resulting from catching cold are due to the removal of heat to an unusual extent from the external or internal surface of the body; that this causes some functional disturbance, which in its turn gives rise to certain morbid processes in some portion of the body, far removed from the part immediately affected

by the cold. That the morbid changes are not due to the immediate or direct effect of this exposure, is evident from the fact, that as a rule, a certain length of time elapses before these changes set in.

The theory of Seitz, it seems to me, is not complete, but leaves the matter still somewhat in the dark. The true action of cold upon the body, in producing morbid conditions, is probably on those nutritive changes which are constantly going on, and by which the animal heat is developed. This heat-production is going on in all the tissues of the body. In order that this function shall not be impaired, it is necessary that the normal temperature shall be maintained. This we know is  $98\frac{1}{2}^{\circ}$ . Any marked deviation from this normal standard, as the result of extraneous influences, results in morbid changes. If heat-production is arrested in a portion of the body, under the action of intense cold, molecular death of the part ensues, as is the case when gangrene of a limb results from freezing. If the action of the cold is insufficient to arrest the nutritive processes of the part, it may cause only inflammatory action. In these cases, we have only the direct action of a low temperature on the organism. In the ordinary phenomena of "taking cold," we have still the results of a low temperature acting on the heat-producing processes, but in an indirect manner. The direct action of the cold is, as a rule, upon the surface of the body, but the resultant morbid condition is upon some organ remote from the exposed part. In both cases, however, the cause and the effect are the same, and the connection between the exposure, and the resultant inflammatory condition, is the disturbance of those nutritive changes in the tissues which result in the production of animal heat. I think this action may be fairly well illustrated by the familiar example of a chandelier of, say, six burners. If these are all lighted, each jet gives forth a steady and equable flame. If now four or five jets are turned off, the remaining jet burns up with a flaring and increased intensity. In the same manner, I think we may explain the phenomenon of an ordinary cold. The nutritive processes going on in the whole economy are governed by the central nervous system, and furthermore, a certain amount of nervous force is expended in the regulation of these nutritive processes. If, as the result of exposure to cold, these nutritive changes are arrested in a certain portion of the body, the same nervous force being sent out from the central system, it will be understood how this local arrest of the nutritive process in one portion would be attended with a certain amount of increased nutritive activity in another portion; the activity of the nerve centres going on as before. Now, increased nutritive activity constitutes inflammation, and this inflammation locates itself at the point of least resistance, viz., as



a rule, at some point in the economy where a mild chronic inflammatory process is going on, which is lighted up into an acute process as the result of a cold. It is not then from an exposure of the whole body, that a cold is contracted, but from an exposure of a part of the body, as the result of which the physiological processes of heat production in that part alone are disturbed, giving rise to increased nutritive activity or inflammation in some organ, far removed perhaps from the site of the primary exposure. As a matter of clinical observation, we know that colds occur during the spring and fall months, seasons which are characterized by moderately low temperature, but with notable dampness of the atmosphere, together with considerable atmospheric motion, or high winds. Hence we recognize that there are three factors generally necessary for the production of "a cold," low temperature, air in motion, and moisture. It is also necessary, as a rule, that one or more of these factors should act for a somewhat prolonged duration of time. As we know, the momentary action of an intense cold, or draft, or moist atmosphere, does not usually result in any morbid changes, but it is only after a somewhat prolonged exposure of the body that the familiar phenomena of a cold ensue. In our ordinary life, there are few of us but that are subject to slight temporary exposures with impunity; as for instance, upon rising in the morning in a cold room, changing one's clothes, etc. On the other hand, the sitting in a draft for a prolonged period, with even only a small portion of the body exposed, may lead to serious or grave morbid changes. Among the most familiar causes of taking cold may be enumerated, sitting in a draft, wearing insufficient clothing, wearing thin-soled shoes, insufficiently protected feet, going from a warm room to a cold room, slight exposure while perspiring, etc. Wearing thin-soled shoes, or insufficiently protected feet, is a very prolific source of trouble; as the loss of heat in this manner is far greater than is usually recognized. Especially is this the case if the soles of the shoes are damp, as in this case, of course, the radiation takes place much more rapidly.

Again, when the body is perspiring, the loss of heat is going on with considerable activity; hence we find that in this condition, even a slight exposure is liable to result in far more serious disturbance than would occur from the same exposure were the body not in an overheated condition. There should, however, be borne in mind this difference, if the perspiration is the result of violent exercise, all the nutritive processes are stimulated to an abnormal activity, animal heat is being generated rapidly, and the perspiration necessarily sets in as a conservative measure, to prevent too



great accumulation of heat in the system, but still as the direct consequence of the violent exercise. If now, in this condition, the body is exposed to the influence of cold, and the perspiration suddenly checked, very serious consequences may ensue. If, however, on the other hand, a copious perspiration is brought on by artificial means, while the body is in a state of quiescence, as in the hot room of the Turkish bath, the heat source is from without, the heat-producing forces of the system are not disturbed, and the cold plunge, while of course it suddenly checks the perspiration, does not, as a rule, give rise to any untoward consequence. Moreover, the exposure by the cold plunge is only temporary and of short duration, and by the subsequent manipulation, any serious loss of heat which may have resulted is speedily and completely restored.

A swimmer will remain in water at a temperature twenty or thirty degrees below that of the body, and that, too, for a somewhat prolonged period of time; but while in the water, he is in a state of constant and laborious activity, thereby setting in play those processes by which animal heat is generated. But even with this constant activity, if the bath becomes too prolonged, there comes a time when the body is unequal to the task of supplying sufficient animal heat to make up for the loss, and the bather succumbs to the direct influence of this tremendous drain upon the system. But here the result is not an inflammatory attack, as usually accompanies an exposure to cold, but on the contrary it produces great prostration, violent cramps, weakened circulation, intense venous congestion, and in fact, evidence that the whole system is robbed of its normal heat, which tends to retard all healthy functional activity in the body; whereas the results of an exposure to cold are due to a localized arrest of heat production, and a disturbance of the balance, as it were, by which nutritive activity goes on in the system. As was said before, the loss of animal heat does not directly produce these morbid changes, but creates or gives rise to certain functional disturbances, with the nature of which we are not entirely acquainted, and these give rise, after a certain interval of time, to the morbid changes which we call taking cold. This interval may be short, lasting perhaps but a few hours, as is usually the case in slighter disorders, or it may be prolonged one or two days, or even more. In this case, as a rule, the resultant disorders are of a more serious character. There is generally attendant upon taking cold, fever of a more or less marked character. That this fever is not symptomatic, but an essential fever, is shown by the fact that it stands in no constant relation to the morbid changes which result, as in even slight disorders we may have the febrile motion more marked than the fever which accompanies the

more aggravated forms of inflammatory troubles which may arise from a cold. Moreover, the fever generally sets in immediately after exposure, and when the later morbid changes appear, no increase of fever, as a rule, is detected. As regards the local disorders, which result from an exposure to cold, we find them manifesting themselves in any part of the body. We may have acute coryza, pharyngitis, gastric catarrh, muscular rheumatism, cystitis, or, in fact, an attack of inflammation involving any of the organs of the body, as the result of a cold. Owing to their exposed situation, being the first to receive the current of inspired air, with its impurities, or whatever of irritating qualities it may possess, the upper air-passages are perhaps more subject to inflammation than any other portions of the body, and once having become the seat of morbid changes, there is always a liability to a recurrence of the attack, from a slighter exciting cause than that which gave rise to the first attack.

Hence, it is probable that catching cold, in a very large majority of cases, develops in an attack of acute inflammation of some portion of the upper air-passages, as being the point of least resistance, and further, as these attacks recur with increased frequency and gravity, we find that the morbid process localizes itself farther down, and nearer to the vital centres, and finally this liability, so called, to take cold, which at first manifested itself in attacks of simple coryza, or sore throat, gives rise to a bronchitis, or some still graver affection which, fixing itself upon the lungs, may prove far less amenable to treatment than the simple attacks which preceded it, or even lead to the development of those still graver forms of pulmonary disease, in the management of which our present therapeutic resources are so feeble.

The question is often put to the physician, whether a catarrh will lead to the eventual development of lung disorders; and it seems to me that the answer should be that it may, and that it often does, in the manner above noticed.

This may not occur by absolute extension of the inflammatory process, but there can be no question that an individual suffering from a chronic laryngeal catarrh is far more liable to an attack of tracheitis, and that one suffering from a tracheitis is far more susceptible to a bronchitis than one in whom there exists no catarrhal inflammation, and so on, down to the deeper lung tissues. Other causes, of course, may operate in inducing such a sequence of events, such as an impairment of the general health from any cause, but a prominent factor still remains in the existing catarrhal inflammation above.

As regards this so-called liability to take cold, it should be un-

derstood that this, in a large majority of cases, and probably in every case, is due to an existing chronic catarrhal inflammation, of perhaps so mild a type as to give rise to but very trivial symptoms, or even pass unnoticed; but still, an existing catarrh, the result probably of a neglected cold, and the renewed attacks to which the individual becomes so liable, consists in a lighting up of the old trouble. As each fresh attack subsides, the resolution which the inflammatory process undergoes is less complete, the chronic trouble makes itself known by more decided symptoms, fresh colds occur with greater frequency, and there is finally established a chronic catarrh, be it laryngeal, nasal, or of any other part, with its many annoyances, its intractability, and unquestionably the possibility of its leading to graver trouble lower down in the air-passages.

Our concern, of course, is mainly with affections of mucous membranes; but in those cases in which we find that a cold gives rise to an attack of rheumatism, gastric catarrh, cystitis, or any disorder other than a catarrh of the lining membrane of the respiratory tract, probably the same rule holds true as before; from some inherited tendency, or acquired weakness, the parts involved in these affections have become the points of least resistance, and hence invite those morbid changes which result from exposure to cold.

PREVENTION OF A COLD.—The natural deduction, of course, from what has been said before is, that those conditions which give rise to a cold should be avoided; especially should this be enjoined upon those possessing hereditary tendencies or weaknesses, and those of whom we speak as liable to take cold. These directions, of course, are more important in the months of the year when we have, to the greatest extent, the prevalence of those conditions which, as we have seen, are concerned in the production of a cold: as low temperature, moisture, and air in motion; these we find in the spring and fall. Perhaps the most important direction that can be given in regard to preventing colds, is as to the proper regulation of the clothing. The body should be sufficiently clothed for warmth and comfort, no less and no more. If too little clothing is worn, there will necessarily result a loss of animal heat. If too much is worn, the body becomes overheated, and perspiration necessarily ensues to reduce the temperature and restore the proper equilibrium, and consequently, as we have before seen, a condition arises in which the body is extremely sensitive, and in which it is especially liable to succumb to the influence of cold or moisture. This rule in regard to clothing the body applies to all parts of it. The mistake should always be avoided of coddling any portion, or of leaving any portion insufficiently protected. A very frequent and common error



is fallen into by many, of crowding on too much clothing upon those portions of the body which they suppose to be subject to some special weakness; as for instance, many people, supposing themselves to have weak lungs or throats, fall into the error of piling wrap upon wrap, muffler upon muffler, around their necks and about their chests, thereby encouraging the very condition which they fear, and incurring the risk they desire to avoid; for the excessive muffling of the parts necessarily leads to perspiration, and consequently the danger of its being suddenly checked upon the removal of the wraps. I know of no more prevalent mistake, nor one which is a more prolific source of mischief, than the habit which prevails to so great an extent among us, of muffling up the neck. Especially is this the case when a cold is contracted which develops in a sore throat. As a rule, when a sore throat comes on, the very first remedy which is adopted is to tie a piece of red flannel about the neck. The only advantage of this procedure lies in a certain amount of counter-irritation, due to the harsh fibre of the flannel rubbing against the skin. Aside from this, there is no possible good to be accomplished. It is put on for a protection; it simply renders the neck and throat more sensitive, and entails a greater liability to take another cold. Of course, what is said about the neck may be said about any other portion of the body. There could be no greater error than to suppose that mufflers about the neck protect the throat or that the chest is protected in any way by extra thickness of covering about it. Indeed, the contrary is quite true. Perhaps the very worst place in which to wear the so-called chest protectors, sold in the drug stores, is on the chest. The chest is infinitely better protected, in one liable to bronchial attacks, by an extra sole worn on the boot, than by a felt pad worn across the chest. The whole theory of clothing should be based on the idea that exposure to cold results in an interference with nutrition in some part of the body. Therefore, to prevent taking cold, the heat-producing force of the body should be thoroughly and equably protected in all parts; in other words, the clothing should be uniformly distributed over the body, with simply enough of it for comfort, and absolutely no more.

The selection of the proper fabric to be worn next the skin is too often dictated by a consideration of luxury, rather than of health. The most important function that goes on in the skin, is that by which the body is kept at an equable temperature, by means of perspiration. Theoretically, this is accomplished by means of an insensible perspiration, and practically too, except under extraordinary circumstances, when the perspiration becomes profuse. Now this function of perspiration, or heat radiation, takes



place best when the fabric next the skin is a thoroughly porous one. We have no fabric comparable to pure wool in this respect; the virtues of this fabric being, I take it, due to the fact that wool-fibre is highly elastic, and also curls upon itself in such a way, as that when converted into thread, and woven into a garment, it still affords a highly elastic and porous textile fabric, which best admits of the escape of heat. Silk probably would never be worn as underwear, were it not for the fact that it is the most expensive of fabrics. From a sanitary point of view, its use is very objectionable, in that cutaneous transpiration is interfered with. The same is true of cotton and linen, in that their fibre is perfectly straight, and is also inelastic. A textile fabric, manufactured from material of this character, is denser and less porous than one made from the kinky wool fibre. Hence the latter furnishes us with a material for underwear which in the least degree interferes with the important function of the skin, above alluded to. As regards the heat-conducting properties of these different materials, this I regard as a matter of little moment, as compared with the far greater importance of wearing next to the skin a thoroughly porous and elastic fabric.

It is the habit to change the thickness of the underwear twice and sometimes even three times during the year, through the varying degrees of cold and heat. This plan is not wise in all cases, and is even a source of mischief. We practically live, during a large portion of our time, in much the same temperature, summer and winter, or rather, we endeavor to keep our houses during winter, at a temperature of about 70°. I doubt very much then the wisdom of wearing very heavy underwear in rooms heated to this degree of heat, as the necessary consequence is a more or less profuse perspiration. A better plan is, therefore, to wear the same thickness of underwear throughout the year, while the protection from the extreme cold of winter is supplied by a change in the outer garments.

As before stated, excessive covering should be avoided under all circumstances. This perhaps is a greater error than insufficient protection, although the latter is undoubtedly a frequent source of trouble. This may be said, perhaps, in regard to the feet, quite as much as of any other part of the body, for coming in contact, as they do, with cold floors and pavements, especially when there is water or moisture on the ground, the loss of heat from the general system from that source is necessarily rapid, unless the foot is thoroughly well protected by a thick, dry sole to the boot. There are few but have experienced the direct effect of standing in slippers or thin-soled shoes upon a damp or cold pavement, and noted

the rapidity with which such exposure makes itself felt. In our climate, with its sudden and marked changes of temperature, the proper regulation of the clothing becomes a matter of considerable importance, and perhaps of no little difficulty. The hands and face are rarely covered, as a rule, or protected, and yet we never take cold from their exposure. The deduction is obvious; if certain parts of the body may be exposed with impunity, the converse conclusion is suggested, that by keeping our bodies too warmly clad we have thereby engendered a necessity, which possibly might have been avoided, with benefit to the health and vigor of the system. The rule may be safely laid down, that, in clothing the body, the trunk and limbs should be made simply comfortable, but never wrapped to the extent of inducing perspiration by the amount of clothing. The foot should be covered with a boot or shoe, with a sole sufficiently thick to prevent the cold or dampness of the pavement being felt through it. The neck should never be muffled, or covered with thick wraps or furs, unless rendered necessary by the piercing winds or cold of midwinter, as a mere matter of protection. The head is endowed by nature with its own protection; hats and caps are luxuries, born of modern civilization; had they never been worn, mankind would be better off, and the demand for hair restorers would never probably have existed. Hats and caps, however, being a necessity of modern life, should be light, well ventilated, and designed to retain as little heat as possible; they should not be too heavy, or press with too much weight upon the head, the crown should be perforated, to allow of as free circulation of air as possible between the top of the head and crown of the hat, and should be constructed of such material as will allow of the escape of heat.

The hair, the natural covering of the head, should be so regulated as to avoid the exposure resulting from the removal of a considerable amount at one time by cutting; if it possesses a luxurious growth, it should not be cut when the removal of so much protection of the head is liable to result in catching cold.

In short, the body in all its parts should be made comfortable. It should not be so clothed as to cause perspiration, nor that chilling can occur. It is said that sealskin sacques have caused more deaths than small-pox in New York, in the last five years. I have no doubt that this is quite true, and the fact is due simply to the vanity or indolence by which a woman will go from the cold air into a warm room, with her sacque on, and remain there for hours, it may be, without removing it. In addition, it might be said that very much harm is done by the habit of wearing heavy clothing, and sitting in overheated rooms. Those who allow themselves to

grow into the habit, by which they are only comfortable in a room at 80°, are simply making hot-house plants of themselves, and are engendering a condition of the system which renders its resisting power very feeble. It is purely a habit, and one easily overcome, not only without risk, but with undoubted benefit to the individual, in the increased vigor of body which will result.

In our variable climate, where the daily changes are oftentimes so great, it is a mistake to suppose that we can so regulate our clothing as to protect ourselves from the results of these great changes. We protect ourselves from absolute cold by wearing clothing, but not from taking cold. We protect ourselves from taking cold, by so regulating our habits of life as regards clothing, etc., that we expose ourselves to these changes with impunity. In other words, we inure ourselves to the climate. Perhaps no better aid to this is afforded than in the use of the bath. I think the direct connection between the daily use of the bath, and the avoidance of taking cold, will be clearly understood if what has been stated is true, viz., that taking cold is a disturbance of the heat-producing forces, and furthermore, that the nice adjustment of the animal heat in the body, is regulated by the function of cutaneous transpiration, and hence depends on the healthy functional activity of the skin. Perhaps we have no better way of maintaining this function at the highest point of healthy activity, than in the daily use of the cold bath. For those whose physique is equal to it, the daily use of the cold plunge or shower bath is to be recommended, as the best protection possible against taking cold. If this is not well borne, it is indicated clearly by the feeling of lassitude, and chilly sensations, which will follow the use of the bath; the contrary being indicated by the sense of warmth and general invigoration which attends its use. If the plunge or shower is not tolerated, the cold sponge, either of the whole body or to the waist, is to be commended. The time at which the bath should be used is preferably in the morning, in that not only the night sleep is a better preparation for it, but also the exhilaration and vigor which follow it, is an excellent preparation for the labor of the day. The Turkish bath, which has become so deservedly popular in our day, while undoubtedly a luxury, is to be commended with a certain amount of reserve as a preventive, or in the treatment of a cold. It is a popular saying, that after a violent perspiration the pores of the skin are so thoroughly opened that the cold gets in, as it were. Of course this is an error. Perspiration due to violent exercise renders one liable to a cold if exposed to a draught. The excessive perspiration of the hot-room of a Turkish bath does not expose one to the same extent, but I think there is an exposure even in



the Turkish bath, especially in the shampooing room, which follows immediately the hot-room, where one is apt to receive a slight chill. As a luxury, then, the use of a Turkish bath is certainly warmly to be recommended. By those suffering from weakness of the upper air-passages, or who are especially liable to take cold, its use is to be resorted to with a certain amount of watchfulness.

These suggestions are, of course, such as every physician is familiar with; they are given here, however, more in the way of suggestions than for instruction, for we are far too prone to overlook and forget them, in our dealings with our patients, and allow them often to violate, through ignorance, simple laws of well living, whose observance might save them much suffering.

TREATMENT OF A COLD.—It is very much to be deprecated, that, as a rule, an ordinary cold is allowed to take its own course without treatment. If a part has once become inflamed, and is permitted to undergo resolution without interference, it is left in a weakened condition, which invites renewed attacks from a very slight cause; for when the acute inflammatory process subsides, complete resolution does not take place, but there is left a morbid condition, very mild in character perhaps, but nevertheless one of chronic inflammation. This may be so slight as to be scarcely noticeable by the patient, and yet it is this condition, which takes on a renewed inflammation from a very slight provoking cause, which oftentimes the patient would escape did it not exist. The ordinary plan of treatment of a cold is so simple, and involves so little trouble, that it is the duty of the physician to urge that all cases, however simple, should be subjected to it.

Remembering the causes, as laid down above, which operate in the production of a cold, the first indication for treatment will be to supply as promptly as possible the deficiency caused by this loss of body heat. If this can be done in the early stages, when the secondary inflammatory process has not progressed, or better still, before it has set in, viz., during the preliminary febrile stage, the further progress of the disorder may be promptly arrested; this constitutes what we generally call the abortive plan of treatment. This plan consists, in short, of producing copious perspiration; this perspiration, be it remembered, however, is not primarily the object it is desired to attain, but it is simply the evidence that that object has been attained. The condition to be corrected is loss of body heat; the measures resorted to for this are measures which have a tendency to increase body heat. The evidence that this has been accomplished, viz., the restoration of this heat, or even more, that an excessive heat has been produced, is manifested by the perspiration. If this so-called sweating can be brought on in the



early stage, it serves the purpose of arresting the future progress of the trouble, and putting an end to the inflammatory process. If it can be brought about early in the progress of the inflammatory stage, its gravity can be very materially lessened; hence, the earlier this abortive treatment is resorted to, the better the result. The means of accomplishing this is by simple remedies, familiar to all.

A decoction of hot tea, taken at bed-time, with the addition of a foot-bath, and a moderate dose of Dover's powder, is all that is necessary; after which the body should be warmly covered in bed, and extreme care exercised to prevent any exposure while the perspiration is going on. If the constitutional symptoms assume a graver form, that is, if the fever seems excessive, and the effect on the general system marked, much benefit will be gained by the administration of ten grains of quinine, in connection with the diaphoresis. It is generally asserted that following a copious perspiration there is danger of contracting additional cold, on leaving the bed in the morning. This probably is a mistake, although the simple precaution should always be taken of allowing the body to cool off gradually before rising, by removing a portion, at a time, of the bed covering, and also remaining indoors for a few hours after dressing. If, as the result of this treatment, all symptoms disappear, little else is needed, except the exercise of ordinary precaution.

If, however, the inflammatory stage has set in, and the result of the sweat has been simply to modify, and not to remove it, other measures, directed to the special locality of the inflammation, should be resorted to. The remedies indicated will be referred to when we come to treat of special diseases. Confinement to the house should be urged in all cases, as of equal if not of greater importance than therapeutic measures, especially if the inflammatory condition shows any possible grave tendencies.

## CHAPTER V.

### THE ANATOMY OF THE NOSE.

#### THE EXTERNAL NOSE.

THE external nose, the most prominent feature of the face, is composed of a bony and cartilaginous framework, covered with muscular tissue and integument. The bony portion of the framework is composed of the nasal bones, and the nasal processes of the superior maxillae.

#### *The Nasal Cartilages.*

—The cartilages are five in number, the two upper and two lower lateral cartilages, often called together the alar cartilages, and a single cartilage in the median line supporting these, the triangular cartilage of the septum. At the junction of the lateral cartilages with the bony framework, two or three sesamoid or accessory cartilages are ordinarily found (see Fig. 53).

These cartilages are joined to each other and to the bony framework, by articulations which allow of a certain amount of motion, which is accomplished through the action of muscles distributed upon their outer surfaces (see Fig. 54).



FIG. 53.—Cartilages of the Nose, seen in Profile. (Sappey.) 1, Right lateral cartilage; 2, its anterior border; 3, an accessory cartilaginous nucleus attached to the inferior border of the same cartilage; 4, anterior accessory cartilages remarkable for their ovoidal form and the constancy of their existence; 5, external branch of the alar cartilage; 6, union of this branch with the internal branch; 7, 8, 9, secondary cartilaginous branches added to the external branch of the alar cartilage; 10, accessory cartilage not constantly found.

*The External Muscles of the Nose.*—These may be divided, for the sake of brevity of description, into those which dilate the nostrils, and those which contract them. To the first group belong the levator labii superioris alæque nasi, which, arising from the nasal process of the superior maxillary bone, passes obliquely downward and outward, and is inserted into the alar cartilage; the dilator naris posterior, arising from the nasal notch of the superior maxilla and from the sesamoid cartilages, is inserted into the skin near



FIG. 54.—Superficial Layer of the Muscles of the Nose. (Sappey.) 1, Levator labii superioris alæque nasi; 2, nasal fibres of this muscle; 3, labial fibres of this muscle; 4, deep portion of this muscle; 5, anterior border of this muscle; 6, anterior fibres of the same muscle inserted at the superior and posterior part of the ala of the nose; 7, Pyramidalis; 8, 9, transverse muscular fibres which converging posteriorly pass beneath the anterior border of the levator.

the margin of the nostril; the dilator naris anterior, whose origin is entirely cartilaginous, and lies immediately in front of the preceding; the compressor nasi, which arises near the incisive fossa, and is inserted by means of a broad aponeurosis into the fibro-cartilage of the tip of the nose, in conjunction with its fellow of the opposite side.

The only muscle which diminishes the lumen of the nostrils is the depressor alæ nasi, which arises from the incisive fossa, and, lying between the mucous membrane and the muscles of the lip, appears to be inserted into the septum and posterior portion of the ala of the nose.

In the lower animals these muscles are highly developed, and perform an important function in the economy, both with reference to respiration and olfaction. In man, however, their importance is not great, although they perform minor duties in connection with respiration, and possibly in the modification of facial expression.

#### THE NASAL FOSSÆ.

The nasal passages are composed of two wedge-shaped cavities, extending from the nostrils in front, to the posterior nares, two

oval-shaped openings, by which they communicate with the upper pharynx. The roof of these cavities is narrow, and somewhat arched from before backward, and is composed of the nasal bones in front, the body of the sphenoid behind, and the cribriform plate of the ethmoid between them. The floor is formed by the palatine processes of the superior maxillæ and the palate bones. The two cavities are separated from each other in the median line by the septum, which is composed of the perpendicular plate of the ethmoid above, and the vomer below. The articulation of these two bones with each other, leaves anteriorly a triangular space which is filled by a cartilaginous plate, the triangular cartilage of the septum. Up to the seventh year of life the septum lies in the median line, but after this time, as Zuckerkandl<sup>1</sup> has pointed out, there is usually some slight deviation to one or the other side, not, however, enough to encroach in any degree upon the breathing space. The outer wall of each cavity is formed by the superior maxillary, lachrymal, palate and sphenoid bones, and is traversed antero-posteriorly by three scroll-shaped bones, commonly called the turbinated.

The lower turbinated bone is a very thin lamella of osseous tissue, curled upon itself, and forming a scroll, as it were, which is attached to a slight horizontal ridge presenting on the outer wall of the cavity. The extent to which this bone is curled upon itself varies in different cases. The lower border of the bone may be smooth, or incisures of various depths may be seen along its surface.

The middle turbinated bone belongs really to the ethmoid, and hence it is sometimes called the lower ethmoidal turbinated. It consists of a broad, thin plate of bone, which, springing from the lateral mass of the ethmoid, passes downward, and is curled upon itself in the same scroll-shaped manner as the lower turbinated.

The superior turbinated springs also from the lateral mass of the ethmoid. It is smaller and less scroll-shaped, and really presents but a small ridge on the outer wall of the cavity, which, while in its posterior portion it is entirely distinct from the middle turbinated bone, anteriorly, is merged with and lost in it.

A fourth turbinated bone, designated as the *concha santoriniana*, has been described by anatomists. Zuckerkandl<sup>2</sup> has found it in fifty-five cases out of 150. Voltolini<sup>3</sup> says that this fourth turbinated bone is found normally in the negro race.

These turbinated bones are nearly parallel with one another,

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<sup>1</sup> "Anatomie der Nasenholen," Wien, 1882, p. 45.

<sup>2</sup> Op. cit., p. 31.

<sup>3</sup> "Rhinoscopie und Pharyngoscopie," Breslau, 1879, p. 70.



and divide each cavity into three passages; the lower meatus, between the floor of the nose and the lower turbinated; the middle meatus between the lower and middle turbinated bones, and the superior meatus between the middle and superior bones.

In the normal state that portion of the fossa, bounded by the cartilaginous framework, consists of a smooth-walled ovoidal cavity, which is suspended in front of the lower and middle passages, and is usually termed the vestibule. In the anterior third of the lower

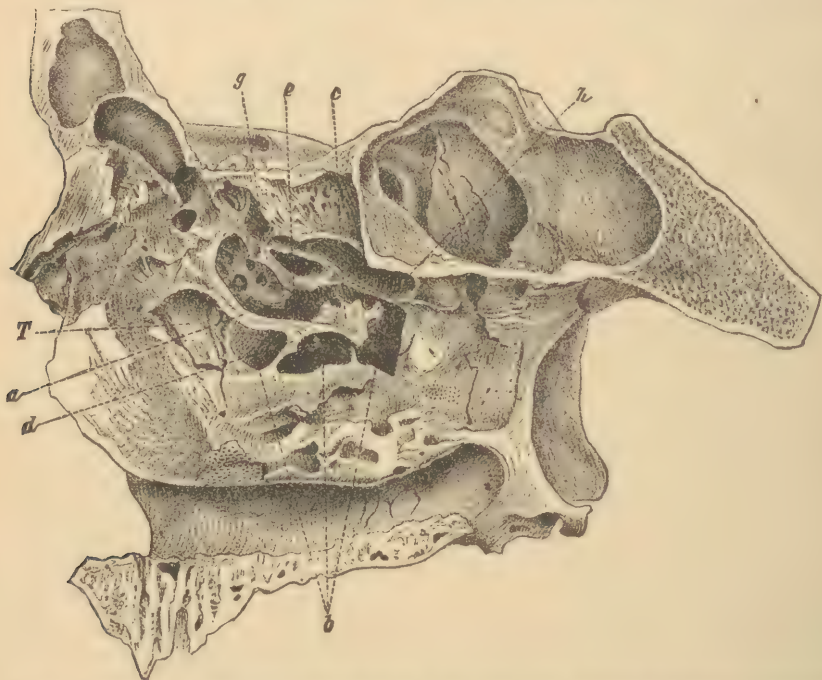


FIG. 55.—Lateral Wall of the Right Superior Maxilla, seen from Within, the Soft Parts being Removed. (Zuckerkindl.) *a*, The unciform process of the ethmoid bone; *b*, spaces between the unciform process, the lower turbinated and the palate bones leading into the antrum, normally closed by the soft parts; *c*, a process maxillaris; *d*, point of union between the unciform process and the lower turbinated bone; *e*, a portion of the furrow between the unciform process and the bulla ethmoidalis; *g*, bulla ethmoidalis; *T*, the lachrymal bone.

meatus, below the lower turbinated bone, is found the opening of the lachrymal duct. Aside from this, the lower meatus presents no points of special interest. Zuckerkindl<sup>1</sup> attaches a certain amount of importance to the fact that the outer wall of the cavity may be more or less hollowed out, thus encroaching upon the cavity of the antrum.

The middle tubinated bone is more or less scroll shaped, like the lower turbinated, and may be described as projecting into the

<sup>1</sup> Op. cit., p. 34.

nasal cavity from the lateral mass of the ethmoid. As a rule, the outlines of this bone are convex, although in many instances we have it presenting a concavity toward the median line. Zuckerkandl<sup>1</sup> finds, in a certain number of cases, that the ethmoidal cells may be continued into the body of the middle turbinated bone, thus giving rise to certain abnormalities of contour, as for instance, when its anterior termination presents a rounded expansion, consisting of a hollow bony shell covered with mucous membrane. This tumor may attain sufficient dimensions to close the normal orifices of the frontal and maxillary sinuses.

Beneath the middle turbinated bone, lies the long unciform process of the ethmoid (see Fig. 55). This may be described as a narrow bony plate, running downward and backward from the tip of the middle turbinated, and almost parallel with its lower border. Its purpose is twofold: to articulate with the superior maxillary bone, by means of thin bony plates, projecting from it, to the wall of the antrum, and with the inferior turbinated by delicate processes from its lower border. These last-named processes close to a greater or less extent, the opening between the nasal cavity and the antrum of Highmore.

Just above the anterior termination of the middle turbinated bone, we find a rounded bulging of the ethmoidal cells, where the ethmoid articulates with the nasal process of the superior maxilla, the *agger nasi*, as first described by H. Meyer.<sup>2</sup>

Beneath the middle turbinated bone, and extending from near the anterior extremity downward and backward, is seen a deep hiatus, the hiatus semilunaris (see Fig. 56). This is, as its name implies, crescentic in shape, and has a direction downward and backward, the convexity looking forward. This furrow is bounded above by a prominence, which is in reality an expanded ethmoidal cell, and is known as the *bulia ethmoidalis*, below, by the unciform process already described. The superior extremity of the hiatus semilunaris presents a somewhat circular opening, the orifice of the frontal sinuses. Following this furrow backward, we find it merging into an opening of a more or less circular shape, and of varying dimensions, the *ostium maxillare*, leading, as the name implies, into the maxillary sinus. This opening is sometimes absent.<sup>3</sup>

Behind this opening, we occasionally find a second leading into the same cavity, known as the *ostium maxillare accessorius*. In this same furrow we also find the openings of the anterior ethmoidal cells, somewhat irregular in their location, but as a rule near the orifice of the frontal sinuses.

<sup>1</sup> Op. cit., p. 29.

<sup>2</sup> "Lehrb. d. phys. Anat." Leipzig, 1856.

<sup>3</sup> Zuckerkandl, op. cit., p. 41.

Above the middle turbinated bone we find the superior meatus, of chief interest from the fact, that into it open the posterior ethmoidal cells and the sphenoidal sinus, by means of the recessus

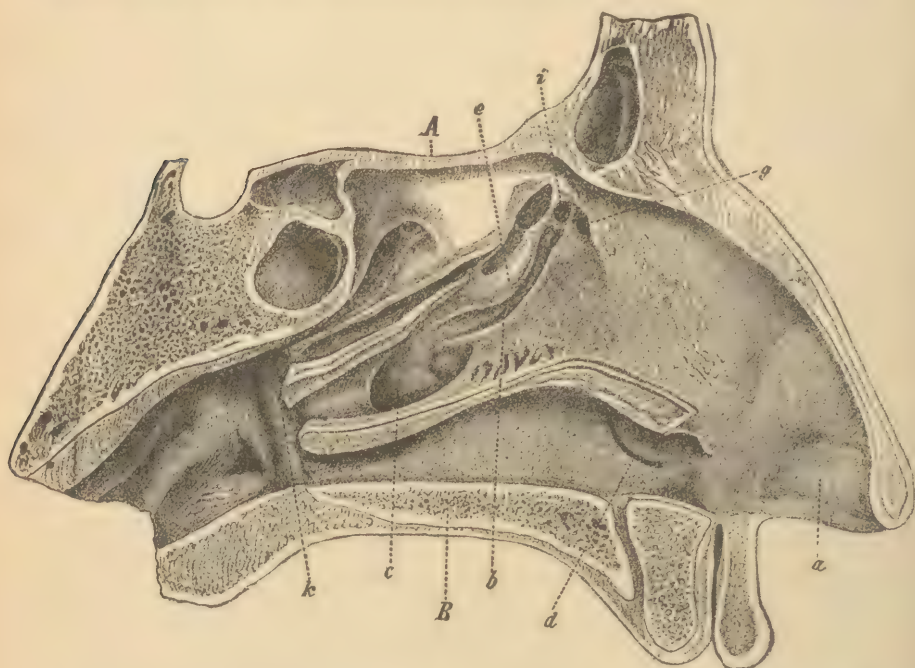


FIG. 56.—Outer Wall of Left Nasal Cavity, the Inferior and Middle Turbinated Bones having been Removed. (Zuckerkandl.) A, Roof of nose; B, floor of nose; *b*, Hiatus Semilunaris and ostium maxillare; *c*, portion of outer wall of nose encroaching upon cavity of antrum; *d*, opening of lachrymal canal; *e*, bulla ethmoidalis; *g*, small canal between anterior insertion of middle turbinated and the ethmoidal cells; *f*, Ostium frontale; *h*, furrow forming boundary between the nasal and nasopharyngeal cavities.

ethmoidalis. This small opening lies in the very posterior part of the superior meatus, and when a fourth turbinated bone is present, is situated immediately behind this.

### THE ACCESSORY SINUSES.

Communicating with each nasal fossa, there are four cavities, usually designated as the accessory sinuses. These are the maxillary, frontal, sphenoidal, and ethmoidal sinuses.

*The Antrum.*—The maxillary sinus, or antrum of Highmore, the largest of these accessory cavities, is a pyramidal-shaped cavity, hollowed out of the body of the superior maxilla. Its roof is formed by the floor of the orbit; its inner wall is composed of the outer wall of the nasal cavity, while its anterior wall is the malar process of the superior maxilla, the posterior aspect of the cavity



forming the zygomatic face of the superior maxilla. This cavity varies considerably in individuals, and even among races. Thus, the depth of the canine fossa may encroach notably upon its anterior wall. As the result of this peculiarity, in the Mongolian races, this cavity is usually small, as noted by Zuckerkandl.<sup>1</sup> Or, again, deficient absorption of the alveolar processes in foetal life, may produce marked encroachment upon the lower portion of the cavity. On the other hand, the cavity may be abnormally enlarged from excessive absorption of osseous tissue in foetal life, downward into the alveolar process (see Fig. 57) or forward, as the result of

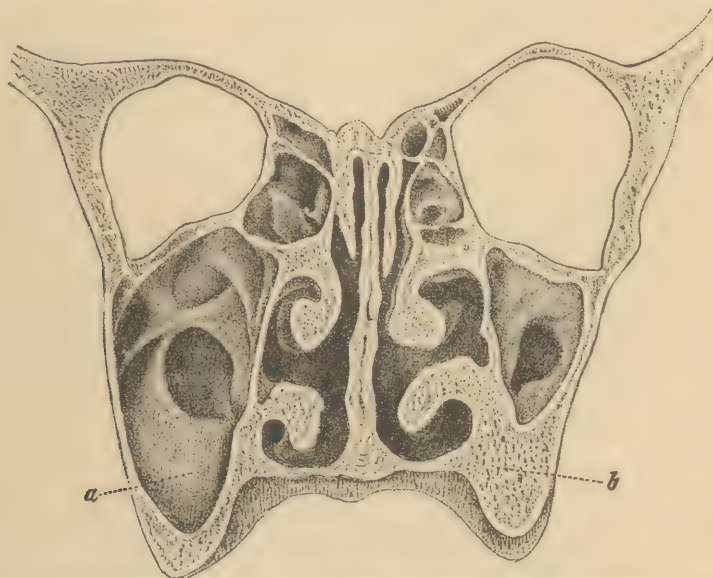


FIG. 57.—Transverse Section through the Nasal Cavities, and Maxillary Sinuses, Showing Irregularities of Development in the Latter. (Zuckerkandl.) *a*, Antrum enlarged by absorption of the alveolus.

which the antrum may extend between the floor of the nose and the hard palate, as seen in Fig. 58, or it may extend up into the malar bone or into the frontal, as the result of a similar process of absorption in this direction.

*The Frontal Sinuses.*—The frontal sinuses are two triangular-shaped cavities, which lie between the two tables of the frontal bone, the floor being formed by the roof of the orbit. They are absent in childhood, but become developed in adult life. They communicate with the nares through the infundibulum, a rounded opening in the anterior extremity of the hiatus semilunaris. Occasionally these sinuses are entirely absent. As a rule, they are separated from one another, but more frequently than in any other of

<sup>1</sup> Op. cit., p. 102.



the accessory sinuses, a normal opening exists from one side to the other, and in still rarer instances, an opening is found between the frontal sinus and the orbit, as seen in Fig. 59, or between this cavity and ethmoidal sinuses.

*The Sphenoidal Sinuses.*—The sphenoidal sinuses are two comparatively large rounded cavities hollowed out of the body of the sphenoid bone, and are separated from each other by a thin lamella of bone or septum. They communicate with the nares by a small opening into the superior meatus. These sinuses are also occa-

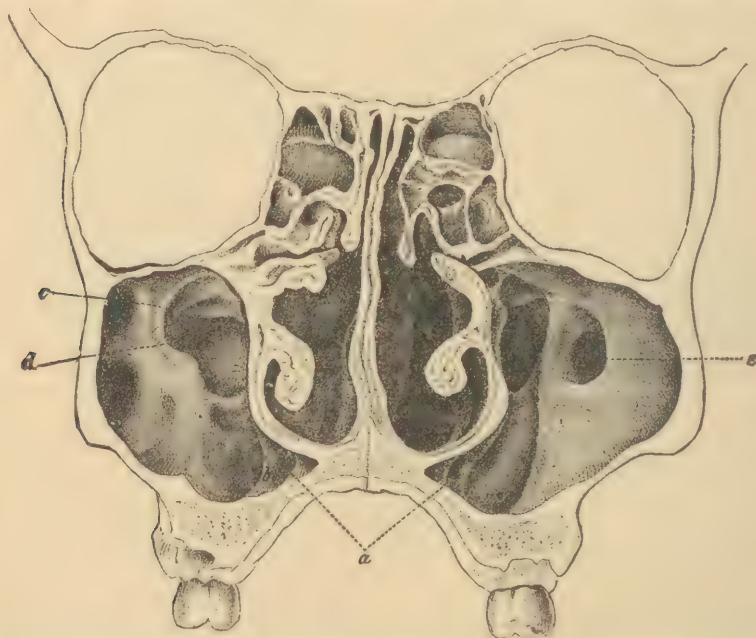


FIG. 58.—Transverse Section through the Nasal Cavities and the Maxillary Sinuses, Showing Irregularities in the Development of the Antrum. (Zuckerkindl.) *a*, Palatine portion of the antrum projecting beneath the floor of the nose; *b*, small bony ridge; *c*, groove of the infra-orbital canal; *d*, infra-orbital portion of the antrum; *e*, prolongation of the antral cavity into the malar bone.

sionally absent, their places being filled by solid bone. Zuckerkindl<sup>1</sup> has also found, in rare instances, instead of two lateral sinuses, a horizontal plate dividing the cavity, in which case the upper cavity opened directly into the ethmoidal cells, the lower opening into the nasal fossa. A still rarer anomaly is that in which the anterior wall is entirely wanting, the cells opening directly into the ethmoidal sinuses.

*The Ethmoidal Sinuses.*—The ethmoidal sinuses differ from all the other accessory cavities, in that, instead of being large hollow cavities, they are composed of a large number of small cells, sepa-

<sup>1</sup> Op. cit., p. 171.



FIG. 59.—Abnormal Opening between the Frontal Sinus and the Orbit. (Zuckerkindl.) *b*, Point of abnormal communication.

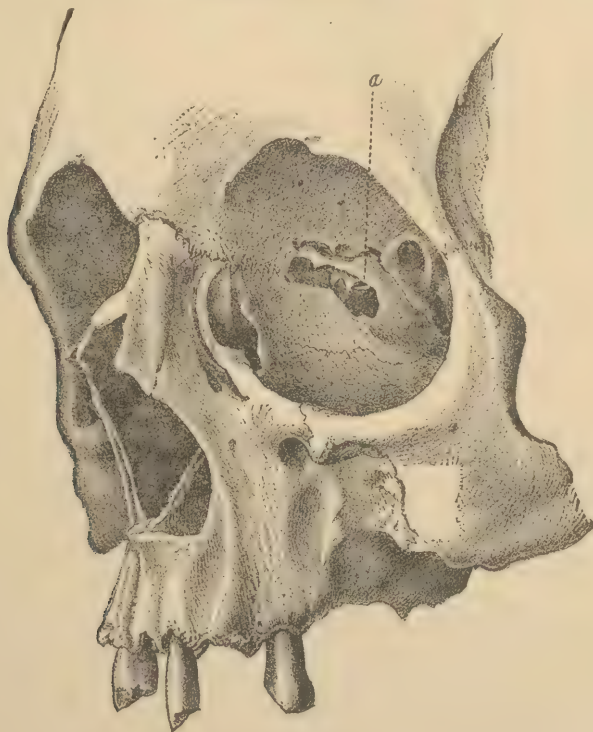


FIG. 60.—Abnormal Opening between the Ethmoidal Cells and the Orbit. (Zuckerkindl.) *a*, Point of abnormal opening.

rated from each other by thin lamellæ of bone. They divide themselves naturally into two groups, the anterior and the posterior ethmoidal cells; the anterior opening into the nasal cavity in the hiatus semilunaris by means of small openings called the ostia ethmoidalia, while the posterior group opens into the superior meatus. The ethmoidal cells are less definite in their boundaries than any of the others, as they may extend either into the sphenoidal cells posteriorly, or into the frontal sinuses. Again, we may have an abnormal opening into the orbital cavity, as seen in Fig. 60, in consequence of which emphysema of the orbit may occur.

The mucous membrane lining these sinuses is continuous with, and differs in no marked degree from that lining the nasal cavities, unless we note that in the maxillary sinuses the membrane is thrown into folds by a sort of redundancy of tissue, as it were.

### THE MUCOUS MEMBRANE.

The mucous membrane lining the nasal cavities is continuous with that of the pharynx, and extends into the Eustachian tubes and the accessory cavities. Its superficial layer is composed of columnar epithelium in the upper portion of the cavities, as low as the middle turbinated bones, and the upper third of the septum. The remaining portion of the lining membrane is endowed with columnar ciliated epithelium, although, according to some writers, the epithelium is also ciliated in some portions of the olfactory tract. This fact becomes of some importance, in connection with those diseases of the cavity which act to destroy, or impair the vibratory motion of the ciliæ, as this function undoubtedly has an influence in promoting the movement of the mucus, and facilitating its discharge; hence, therefore, its abolition increases the tendency to an accumulation of the discharges in diseased conditions.

The muciparous glands are generally of the tubular variety, and possess no peculiar characteristic, except, as observed by Zuckerkandl,<sup>1</sup> that they are very long, and extend to the deep layers of the mucous membrane, even to the periosteum.

In addition to the muciparous glands, we also find in the olfactory region, namely, that part above the middle turbinated bones, tubular glands which, from the name of their discoverer, are called Bowman's glands.<sup>2</sup> These glands are lined with rounded epithelium, which in the blind extremities is large, granular, and contains a certain amount of pigment.

In that portion of the nose immediately within the nostril,

<sup>1</sup> Wien. Med. Wochenschr., 1884, vol. 34, No. 38, p. 1124.

<sup>2</sup> Todd Bowman's "Physiology and Anatomy" vol. ii.



called the vestibule, we find the mucous membrane largely endowed with vascular papillæ, and covered with squamous epithelium, in fact, so closely resembling the integument that, as Moldenhauer observes,<sup>1</sup> it is really to be regarded as a process of the skin.

We find, also, in this locality a number of stiff hairs, termed vibrissæ, whose object is merely to purify the inspired air.

*The Nerves.*—The innervation of the nasal mucous membrane has its source in the olfactory nerve, together with the nasal branch of the ophthalmic, the superior maxillary branches of the trigeminus, and filaments from Meckel's ganglion. The olfactory nerve supplies the nasal cavity with the special sense of smell. This nerve arises by three roots, an external root commencing in the deep substance of the middle lobe of the cerebrum, a middle root from the carunculum annulare, and an internal, from the inner and back part of the anterior lobe. These three roots unite in a flat band which passes forward along the base of the brain until it reaches the upper surface of the ethmoid plate. Here it is expanded into the olfactory bulb, which gives off from fifteen to eighteen branches on either side, which, piercing the cribriform plate, are distributed to the mucous membrane covering the superior and middle turbinated bones, and the upper third of the septum. They terminate in minute thread-like filaments, which pass to the surface of the membrane, between the epithelial cells. In the continuity of this filament, before it reaches the surface, there is found a minute bulb-like expansion, the olfactory cell, as shown in Fig. 61.

The nasal nerve, arising from the ophthalmic division of the trigeminus, enters the orbit between the two heads of the external rectus, crosses the optic nerve and passes into the cranial cavity through the anterior ethmoidal foramen, only to pass out again into the nose through a slit beside the crista galli, and there immediately divides into two branches: an internal, which supplies the mucous membrane near the anterior part of the septum, and an external, which, descending in a groove on the inner surface of the nasal bone, and sending a few filaments to the mucous membrane as far down as the lower turbinated, becomes cutaneous at the junction of the upper lateral cartilage with the nasal bone, and furnishes cutaneous sensibility to the tip of the nose.

The branches of the anterior dental nerve supplying the mucous

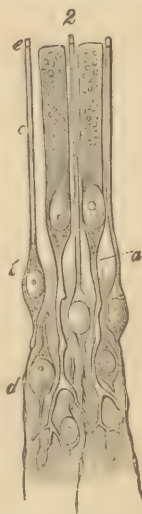


FIG. 61.—The Olfactory Cells in man. (Max Schultze.)

<sup>1</sup> "Die Krankheiten der Nasenhöhlen," Leipzig, 1886, n. 9.





ward, along the lower part of the septum, and pierces the hard palate through the anterior palatine foramen, joining the anterior palatine nerve.

The Vidian nerve is formed by the union of the greater superficial petrosal and the carotid branches. The former arises from the facial nerve; the latter from the sympathetic plexus which surrounds the carotid artery. These branches unite into one nerve trunk, which passes through the Vidian canal, terminating in Meckel's ganglion.

We thus find the mucous membrane endowed with general sensation through the same nerve trunk as that by which vaso-motor control is exercised, namely through the fifth nerve. This peculiar anatomical characteristic in the nasal mucous membrane, has been very largely made use of to substantiate the various theories as regards the causation of hay-fever, asthma and other so-called reflex neuroses. I question if these theories rest on any well-substantiated grounds as yet.

*Blood-Vessels.*—The vascular supply of the nasal fossæ is derived from the anterior and posterior ethmoidal arteries, branches of the ophthalmic, which supply the ethmoidal cells, frontal sinuses, and roof of the nose; the sphenopalatine, from the internal maxillary artery, distributed to the mucous membrane covering the spongy bones, and the septum; and the alveolar branch, from the internal maxillary artery, supplying the lining membrane of the antrum.

### THE TURBINATED BODIES.

In addition, however, to the parts already described, there are found *beneath* the surface of the mucous membrane, on the faces of the lower and middle turbinated bones, large plexuses of blood-vessels, the turbinated bodies, which have figured so extensively in our literature of the last fifteen years, and have been the subject of so much speculation and discussion. This mass of blood-vessels was recognized by anatomists in the last century, but in a vague and somewhat indefinite way.

According to John Mackenzie,<sup>1</sup> the spongy character of this tissue attracted attention as early as 1656, being mentioned by Rolinc.<sup>2</sup>

Schneider<sup>3</sup> recognized it as containing vascular tufts, but did

<sup>1</sup> "Historical Notes on the Discovery of the Nasal Erectile Tissue." Boston Med. and Surg. Journal, Jan. 1st, 1885.

<sup>2</sup> "Dissertationes Anatomicae," Noribergæ, lib. ii., cap. 20.

<sup>3</sup> "De Catarrhis," Wittburgæ, 1661-62, lib. v., passim.

not recognize its cellular structure. This was first mentioned by Ruppert.<sup>1</sup>

Duverney<sup>2</sup> gives a more detailed description, and states that the membrane can be inflated by a blow-pipe inserted into the veins.

The first to announce distinctly its true erectile nature was probably Cruveilhier,<sup>3</sup> who described it as a very vascular and truly erectile tissue, and demonstrated its structure by the injection of mercury through the lymphatics.

The first careful anatomical investigation of the tissue was made by Kohlrausch,<sup>4</sup> who described what he supposed to be large venous sinuses, existing in the deep layer of the membrane. Such a plexus had been previously referred to by Hyrtl, as acknowledged by Kohlrausch. It was subsequently claimed as an independent discovery by Kölliker.<sup>5</sup> In 1873, Bigelow<sup>6</sup> made some very careful observations of these structures, in which he demonstrated the existence of erectile tissue. It should be stated, however, that Kohlrausch<sup>7</sup> in his investigations had shown the existence of loops or helicine arteries, which at that time were recognized as an anatomical condition characteristic of erectile tissue. Kohlrausch's investigations were made in the moist tissue. Bigelow inflated the moist tissue with a blow-pipe inserted into the veins themselves, as had been already done by Duverney<sup>8</sup> and made his sections after the preparations had been allowed to dry. Bigelow's demonstrations showed a very beautiful spongy tissue, as shown in Fig. 64. These observations were subsequently very nicely confirmed by Ischwald.<sup>9</sup> All these investigators asserted that this tissue was erectile tissue, their conclusions being based apparently on anatomical study alone.

Zuckerkandl,<sup>10</sup> however, whose classical work on the anatomy of the nose is the standard authority to-day on this subject, has made an exhaustive anatomical study of this membrane, in which he describes the mucous membrane covering the turbinated bones as consisting of connective tissue, the upper surface covered with flat

<sup>1</sup> "Diss. inaug. med. de tunica pituitaria, ejus anatomiam, physiologiam et pathologiam exponens," Vetero Pragæ, 1754, pars i., p. 23.

<sup>2</sup> "Œuvres Anatomiques," Paris, 1761, tome i., p. 222.

<sup>3</sup> "Traité d'Anatomie descriptive," Paris, 1845, tome iv., p. 55.

<sup>4</sup> Müller's Archives, 1853, p. 149.

<sup>5</sup> "Handbuch d. Gewebelehre des Menschen," Leipzig, 1867, p. 741.

<sup>6</sup> Boston Med. and Surg. Journal, April 29th, 1875.

<sup>7</sup> Loc. cit.

<sup>8</sup> Loc. cit.

<sup>9</sup> Progrès Médical, Sep. 10th, 1887.

<sup>10</sup> Wiener medizinische Wochenschrift, 1884, vol. 34, No. 38, pp. 1121-1125. "Schwellgewebe der Nasenschleimhaut und dessen Beziehungen zum Respirationspalt."



epithelium, the deep layer forming the periosteum of the turbinated bones. Between these two layers we have abundant lymph tissue, and possibly lymph glands, although these have not been definitely made out. The tissue covering the turbinated bones is studded here and there with tubular mucous glands, many of which extend completely through to the periosteum. Within this lymphoid structure we have abundant venous plexuses to which he gives the name "Schwellkörper" (swell bodies). About the venous plexuses, the unstriped muscular fibre is abundantly distributed. The definite localization of the venous plexuses serves to distinguish this tissue from true erectile tissue, such as is found in the corpora cavernosa of the penis. The arterial supply is derived from the spheno-palatine artery. The capillaries are divided into three sets,

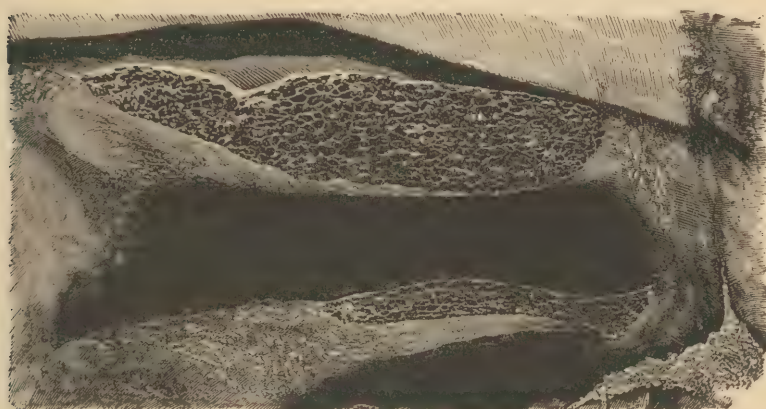


FIG. 64.—Section of the Cavernous or Erectile Tissue of the Middle and Lower Turbinated Bones, Inflated and Dried,  $\times 2$  diameters. (Bigelow.)

one set being distributed to the periosteum, the second to the glands, the third to the surface. The capillaries distributed to the surface form loops which empty into the veins, together with the superficial gland capillaries. The deeper gland capillaries, and those distributed to the periosteum, pass into the veins, forming the so-called Schwellkörper, and the blood is then conveyed by venous channels in the periosteal surface of the membrane, to five distinct plexuses, one going to the veins of the face, the second to the veins of the cranium, the third to the orbit, the fourth to the soft palate, and the fifth to the hard palate. These Schwellkörper are distributed according to Bresgen,<sup>1</sup> as follows: one over the lower turbinated body, one along the border of the middle turbinated

<sup>1</sup> "Der Circulationsapparat in der Nasenschleimhaut, vom klinischen Standpunkt betrachtet," Deut. med. Wochenschrift, Berlin, 1885, Nos. 34, 35.



body, and one at the posterior extremity of each of the turbinated bodies.

We find, therefore, the nasal cavity containing this most intricate and delicate apparatus, which is designed to subserve the function of serous exudation. The special method by which this serous transudation takes place we are scarcely ready to describe, though a very important suggestion comes to us from the notable observation of Chatellier,<sup>1</sup> who describes certain minute canals, running at right angles to the mucous membrane, penetrating to the lymph channels. Chatellier makes the suggestion that these canals serve the purpose of serous channels. The question arises, whether Chatellier's canals may not be the tubular mucous glands of Zuckerkandl.

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<sup>1</sup> *Annales des Mal. de l'Or., etc.*, No. 6, June, 1887.

## CHAPTER VI.

### THE PHYSIOLOGY OF THE NOSE.

THE nose performs a threefold function in the economy. It is the organ which presides over the sense of smell; it gives a certain character and resonance to the voice; and it has a special duty to perform in connection with respiration.

#### THE SENSE OF SMELL.

Minute particles of odorous bodies, floating in the atmosphere, are drawn into the nasal cavity with the act of inspiration, where, being arrested, and lodging against the moist membrane of the olfactory tract, they are dissolved in its mucus, and in this state of solution, coming in contact with the terminal filaments of the olfactory nerve, their peculiar qualities are recognized and appreciated. The proper enjoyment of this function requires that the membrane shall be in a moist condition, that it shall not be clogged by any accumulation of unhealthy mucus or other matters, and that the nasal cavity shall be freely open, and not occluded by tumors or other morbid conditions, but that the inspired air shall have free access to the olfactory tract; and, furthermore, that the olfactory nerve shall be in a healthy condition.

That the membrane must be in a moist condition, is shown by the loss of the sense of smell in those suffering from atrophic rhinitis or dry catarrh. Again, if the membrane is clogged by the secretions of a syphilitic ulcer, or occluded in any way which prevents the transmission of the odorous particles to its surface, this sense is abolished. Of course, the occlusion of the nares from the presence of tumors, or from an ordinary acute rhinitis, more or less completely abolishes the enjoyment of this function.

It is still a subject of speculation as to just how the olfactory nerve receives impressions from odorous particles. Liegeois<sup>\*</sup> contends that the minute particles from odorous substances, impinging upon the surface of the mucous membrane, come in contact with, and mechanically irritate the terminal filaments of the olfactory

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<sup>\*</sup> Arch. de Physiologie, 1868.

nerve. Graham<sup>1</sup> has a curious theory that an odor is appreciated by means of its oxidation in the nasal mucous membrane, basing this view on the ground that all odorous particles are easily oxidizable, while the converse is true of inodorous matter. Ramsay<sup>2</sup> finds a relation between the molecular weight of bodies and their odorous qualities, and hence advances the theory that olfaction is the result of molecular vibration. Those bodies possessing high odorous qualities, are made up of molecules in a state of high molecular activity, in which the rate of vibration is very rapid. Going down in the scale, we come to bodies made up of molecules in which the rate of molecular movement is too slow to be appreciated by the olfactory nerve. Tyndal<sup>3</sup> has found matters to be odorous in proportion as they possess the property of heat absorption, which would suggest a theory of olfaction based on the action of heat. Ogle,<sup>4</sup> in a somewhat elaborate study of this subject of olfaction, has found the sense of smell intimately connected with the distribution of pigment, supporting his view with a number of very ingenious clinical observations, as for instance, he notes that white herbivorous animals are far more frequently poisoned than others, owing to the feebleness of their olfactory powers. He also cites the case of a negro boy, who, as the result of a cutaneous affection, became white, with the result of complete loss of the sense of smell; and still further observes the fact, that the dark-skinned races in general, possess far more acute olfactory powers than the Caucasian races. Hence, he evolves the theory that the pigment in the nasal fossæ, secreted by Bowman's glands, serves an important part in the olfactory function, but confesses a difficulty in explaining just how it acts. He instances, however, the well-known fact that dark clothing is a far more active vehicle of contagion than light, and, further, that odors are retained for a greater length of time by dark clothing. He goes on to draw an analogy between sight, hearing, and smell, in that the pigmentation of the choroid layer, and the aural ampullæ, serves as a vehicle for the reception of light and sound, and he goes on to suggest that, if color is dependent upon heat, why may not an odor, and therefore that the pigment in the nose serves simply as a vehicle for receiving the waves of odor.

These theories, at best, are largely speculative, and we content ourselves merely with the assertion already made, that the appreciation by the olfactory nerve, of odorous particles, requires simply a healthy condition of the nerve, a healthy membrane, and a patulous cavity. That olfaction is accomplished entirely by the olfactory

<sup>1</sup> Bain's "Science and Intellect," 3d ed., p. 152.

<sup>2</sup> Nature, vol. 20, p. 187.

<sup>3</sup> "Contribution to Molecular Physics in the Domain of Radiant Heat," p. 99.

<sup>4</sup> Med. Chirurgical Trans., vol. 53, p. 263.

nerve, has been amply demonstrated by physiological experiment, and is further shown in the fact that the nerve, and the olfactory bulb, are very largely developed in those animals in whom the sense of smell is unusually acute.

The general sensibility of the membrane is derived from the branches of the trifacial already described. The sense of smell is intimately associated with the sense of taste, in that the loss of olfaction is always attended by more or less complete loss of the sense of taste. This is explained by the fact, that the special sense of taste is supplied to the tongue from the glosso-pharyngeal nerve and perhaps the gustatory, and really consists in the appreciation of either the acid, bitter, sweet, or saline character of substances applied to it, and nothing more. The nicer appreciation of flavors is entirely the result of impressions made on the terminal filaments of the olfactory nerve.

#### THE FUNCTION OF THE NOSE IN PHONATION.\*

The function of the nasal cavity in modifying the voice, is one of no little importance, and consists mainly in acting as a resonant chamber, as it were, by which the vocal tones are re-enforced. The voice is formed by vibrations of a column of air, set in play by the movements of the vocal cords; its pitch being regulated by their tension; and its volume being dependent upon the force with which the current of air is driven through the rima glottidis, and hence, by the lateral reach of each cord in a single vibration. The character of the voice, on the other hand, or the tone by which each voice is given its individuality, is dependent largely on the pharynx, mouth, and the formation of the nasal cavity. The larynx simply forms the voice, articulate language being constructed out of the vocal waves, by the movements of the soft palate, tongue, lips, and cheeks.

In uttering certain sounds, the soft palate is raised against the wall of the pharynx, and the nasal cavity is more or less shut off. This occurs in the utterance of all the vowels, which are purely oral tones. In the utterance of other sounds, the palate is relaxed, and the air in the nasal cavity, as well as that in the mouth, is thrown into vibration, giving a nasal twang to the voice; this occurs in uttering *m*, *n*, *ng*, etc. A good voice is dependent on the proper use of both the nasal and oral vibrations, and therefore requires that the nasal cavity shall be free from obstruction (by tumors, hypertrophy of its lining membrane, etc.), and that the movements of the soft palate shall not be interfered with.

When we make the statement that the vowels are purely oral tones, we overlook a very important fact observed by Meyer,<sup>1</sup> that

\* "The Organ of Speech," Amer. ed., New York, 1884, p. 236.



the vibrations of air in the oral cavity, give rise to vibrations in the nasal cavity, the force being transmitted directly through the hard palate. In this connection Czermak,<sup>1</sup> who has investigated the movements of the soft palate in the utterance of the vowel sounds, by means of a probe passed through the nose, showed the soft palate elevated to the highest degree in the utterance of *i* (English *ēe*), and the lowest in the utterance of *a* (American *ah*), which would indicate a notable change in the nasal chambers, in the utterance of these various sounds. Furthermore, a nasal element, I think, is recognizable in the utterance of all sounds, whether oral or nasal. This is even more notable by their absence, as in cases in which the anterior nares are completely occluded, the voice is notably affected, although still possessing the nasal element, by the transmission of vibrations through the hard palate. The same is true, also, where the posterior nares are occluded, as by the result of an adenoid growth in the pharynx. The complete ablation of the nasal chambers, as when they are filled with neoplasms, gives rise to a totally different character of the voice, in which the nasal twang is absolutely destroyed. The prominent function, then, of the nose in phonation, is as a resonant chamber to the voice, used in the production of all articulate sounds.

We find an additional and somewhat important function of the nose, in that its upper partial tones, or the overtones described by Helmholtz,<sup>2</sup> serve to re-enforce the harmonics of the voice. In other words, the fundamental note of the voice gives rise to a secondary series of vibrations of the current of air in the nasal chambers, viz.: Helmholtz's overtones, the resultant tone being one which is pleasing to the ear.

It would seem also, that the nasal cavities possess a certain amount of importance as an aid to articulate speech, as is evidenced by the fact, that where these cavities are closed, articulation is fatiguing and the voice soon breaks down with any effort requiring prolonged use, the whole difficulty disappearing, as a rule, upon the removal of the obstructing conditions in the nose.

In the same way, we find that the integrity of the nasal cavity is of special importance in the production of the so-called head-notes, as is shown by Gordon Holmes.<sup>3</sup> Hence, while the singing voice demands an absolutely healthy condition of this cavity for the management of all its registers, it is absolutely essential for

<sup>1</sup> "Ueber das Verhalten des weichen Gaumens beim Hervorbringen der reinen Vocale." (Sitzungsberichte der Wiener Akademie—mathematisch-naturwissenschaftliche Klasse, Bd. xxiv., S. 4, März 1857.)

<sup>2</sup> "Die Lehre von den Tonempfindungen," Heidelberg, 1863.

<sup>3</sup> "Vocal Physiology and Hygiene," London, 1879, p. 129.

vocalization, and especially for articulation in the upper or head-register.

### THE FUNCTION OF THE NOSE IN RESPIRATION.

The nose is usually regarded as merely the organ of olfaction, while its respiratory and phonatory functions are looked upon as somewhat secondary in character. This view I regard as an entirely mistaken one, in that the nasal passages contain an exceedingly important, perhaps the most important, and certainly the most intricate apparatus, connected with the function of respiration, of the whole respiratory tract, and one on whose normal functional activity depends the integrity of the whole of the mucous membrane of the respiratory tract below.

The ancients believed that respiration was for the purpose of cooling the blood. Helvetius, in 1729, supporting this view, adduced, as an argument in its favor, the fact that the area of the pulmonary vein was larger than that of the pulmonary artery. In 1823, Friedrich Hempel<sup>1</sup> asserted that the air was heated in the lungs, making no reference to the nose or mouth as bearing part in this function, regarding the nose as an organ to test the quality of the inspired air, before its passage into the lungs. In 1829, Magendie<sup>2</sup> wrote: "By successively traversing the mouth, nasal cavities, pharynx, larynx, trachea, and bronchi, the inspired air becomes of a similar temperature with the body. . . . The inspired air is charged with vapor which it carries away from the mucous membrane of the air-passages, and in this state, always hot and humid, it arrives at the pulmonary lobules." In the same year, Adelon,<sup>3</sup> making no mention of the functions of the nose in respiration, speaks of the moisture of the expired air having its sole source in the lungs. In 1844, we find Dunglison<sup>4</sup> making the following statement: "In passing through the mouth, nasal fossæ, pharynx, larynx, trachea and bronchi, the inspired air acquires pretty nearly the temperature of the body." As early as 1845, however, we find appearing in medical literature, evidence of the recognition of other and important functions as belonging to the nasal chambers, independent of the other portions of the upper air-tract. The first evidence of this I find given by Vierordt,<sup>5</sup> who, I think, was the earliest to emphasize the fact that the air is raised in temperature in passing through the nasal chambers, thus recognizing the fact that the

<sup>1</sup> "Einleitung in die Phys. und Path. des Mensch."

<sup>2</sup> "Physiology," Edinburgh, 1829, Milligan's translation, 3d ed., p. 387.

<sup>3</sup> "Physiologie de l'homme," Paris, 1829.

<sup>4</sup> "Human Physiology," 5th ed., vol. ii., p. 31.

<sup>5</sup> "Physiologie des Athmens," Carlsruhe, 1845.

other portions of the upper air-tract contribute no part in this important function.

In 1864, we find Nestor Grehant<sup>1</sup> investigating this subject experimentally. His apparatus consisted of a glass tube containing a thermometer, through which the expired air was made to pass by inserting the tube in the mouth. To protect the thermometer from the temperature of the surrounding air, which might thus vitiate the experiment, the tube containing it was enclosed within a second tube, and the space between was filled with cotton.

Grehant found, with the temperature of the room at 12° C. (53.6° F.), and the patient breathing seventeen times per minute, inspiring through the nose, that the temperature of the air expired through the mouth and apparatus was 35.3° C. (95.5° F.). If, instead of inspiring through the nose, the end of the tube within the mouth was closed with the tongue, and inspiration was performed through the mouth and expiration through the tube, then the temperature of the expired air was only 33.9° C. (93° F.). Although, as will be shown further on, these results are erroneous, the investigations go to show that, even at this time, the importance of the nose as an organ of respiration was beginning to be recognized.

In a second series of experiments, Grehant showed that the expired air was saturated with moisture at a temperature of 35° C. (95° F.) and not at 38° C. (100.4° F.) as Valentine had before stated. The error had been made on account of the momentary cooling of the surface of the hygrometer by the expired air; by correcting this error of experimentation, by enclosing the polished face of the hygrometer so that the expired air should not momentarily cool its face, the true result was obtained.

Subsequent to this, we find such standard works on physiology as Dalton and Foster making no mention of the fact that the air is warmed and moistened within the nose and mouth, before entering the lungs. Flint,<sup>2</sup> however, writes as follows: "The vapor in the expired air is derived from the entire surface which is traversed in respiration, and not exclusively from the air-cells. The air which passes into the lungs derives a certain amount of moisture from the mouth, nares, and trachea. The great vascularity of the mucous membranes in these situations, as well as of the air-cells, and the great number of mucous glands which they contain, serve to keep the respiratory surfaces constantly moist. This is important, for only moist membranes allow the free passage of gases, which is, of course, essential to the process of respiration."

<sup>1</sup> Thèse de Paris, 1864, No. 161, "*Recherches physiques sur la respiration de l'homme.*"

<sup>2</sup> "*Text-book of Human Physiology,*" N. Y., 1876, p. 154.



Rosenthal<sup>1</sup> claims that air is already warmed and saturated when it reaches the alveoli.

These functions, however, are attributed to the nose in a somewhat adventitious manner, and the general view seems still held that olfaction is the main function of the nasal mucous membrane. Even as late as 1878, we find Remy<sup>2</sup> alluding to the nose as the organ of olfaction, and directly stating that its other functions are purely secondary and adventitious. Remy first states that the watery secretion of the nose is for the purpose of moistening odorous particles by which they are rendered sensible to the olfactory nerve. His exact language is as follows: "*Cette membrane forme l'extrémité supérieure des canaux respiratoires, mais ce n'est pas là son principal but. Cette muqueuse fait partie constituante d'un organe des sens, et ce n'est qu'accessoirement qu'elle sert à un autre usage qu'à la fonction sensorielle.*"

In a paper on this subject in 1885<sup>3</sup> I gave somewhat in detail certain views entertained in regard to the respiratory function of the nasal chambers, which were based largely on clinical observation, which I quote somewhat in detail here, as follows:

"The normal function of the mucous membrane is to secrete mucus, and only in such quantities as are sufficient to keep the membrane in a soft, moist, and pliable condition. Any excess of this amount becomes a morbid secretion. Normally, nasal mucus is composed of 93 per cent of water and 7 per cent of solid matter. Robbed of a small portion of this water it becomes thick, inspissated, and unhealthy. Now, as we know, every breath of air that passes through the nasal chambers, and reaches the passages below, must become surcharged with moisture; otherwise it would rapidly exert a deleterious influence on the mucous membrane of the air passages beyond, by robbing them of their moisture, and so rendering their mucus thick and inspissated. It is estimated by physiologists that in the course of twenty-four hours about five thousand grains of water are taken up by the inspiratory current of air, in its passage through the respiratory apparatus. If, in other words, the humidity of the inspired air be compared with that of the expired air, it will be found that, in addition to the other changes as regards carbonic acid and oxygen, the inspired air will have gained five thousand grains of water. Now, I think, I am safe in saying that if five thousand grains of water were extracted from the mucous membrane of the bronchial tubes and air-cells in the course

<sup>1</sup> "*Handbuch der Physiologie*" von Hermann, 1880, iv., 2 S. p. 389.

<sup>2</sup> Thèse de Paris, 1878, "*La Membrane muqueuse des fosses nasales.*"

<sup>3</sup> "*Hay Fever, Asthma and Allied Affections,*" N. Y. Med. Jour., April 24th and May 1st, 1886.



of twenty-four hours, the result would be complete destruction of their function, to such an abnormally dry condition would they be reduced; for, as we know, in each act of respiration, the inspired air reaches only the larger bronchial tubes, and the source of moisture, therefore, of the inspiratory current cannot be from the smaller bronchial tubes or air cells. We are, therefore, forced to the conclusion that this surplus of five thousand grains is taken up by the inspiratory current during its passage through the nasal chambers, and is still retained by it as it makes its way out through the air-passages, for the only source from which this amount of water could be taken up is the nasal mucous membrane. Certainly from no other mucous membrane of equal area in the body, is it possible that such an amount of water could be secreted in twenty-four hours in health. Now, the mucous membrane of the lower air-passages is endowed with no especial apparatus for the secretion of water; the only secretory apparatus with which it is endowed is in the mucous glands, which secrete mucus alone.

“In the nasal mucous membrane, however, we find an apparatus capable of furnishing this water, and this is the so-called erectile tissue of the turbinated bodies. The necessity for some such apparatus I need not refer to, further than to say that it is absolutely necessary and essential, for the integrity of the lower air-passages, that the air which reaches them should be so far charged with moisture that they should not be robbed of any of their secretion. Especially is this true in a variable climate like ours, in which so great changes occur, characterized by excessive humidity or absolute dryness of the atmosphere.

“This, then, is the great and prominent function of the nasal chambers, to so prepare the ingoing current of air that it shall exercise no injurious influence on the mucous membrane of the passages below. It has always seemed to me that this great respiratory function of the nasal chambers, has been to an extent overlooked, in regarding the nose as an olfactory organ, for whereas impairment or loss of the sense of smell is but an inconvenience, and not dangerous to the health, the impairment of the respiratory function of the nasal cavities involves very serious danger. Thus the nose as a respiratory organ, becomes infinitely more important to us than as an olfactory organ.

“As before stated, the nasal chambers contain no glands which secrete other than mucus. There are no serous glands. The mechanism, however, by which the water is poured out into the nasal chambers, and the ingoing current thus surcharged with moisture, is in this so-called erectile tissue. The watery constituents of the blood transude the mucous membrane, and appear on

the tortuous surfaces and passages of the cavity. Now, unless, the blood-vessels underlying a membrane called upon for this duty were very large and very numerous, they would be inadequate to supply this large demand. Nature, therefore, has furnished the membrane in this region with such an abundant supply of large tortuous vessels, that they assume the appearance of erectile tissue, and thus have given rise to this erroneous idea as to their function, suggested by the name erectile tissue. Were the blood-vessels in this region of the same calibre and capacity as those of other portions of the air-tract, it is easy to understand how the extraction of so great a quantity of water would soon render the current sluggish, by its greater consistence, and so completely arrest the function which they were designed to subserve. In addition to this large blood-supply, there must be, of course, some delicate mechanism by which this function is regulated. This control is exercised by the vaso-motor system of nerves. So delicately must this be arranged, that the transudation of serum must accurately adapt itself to every existing atmospheric condition. To-day, for instance, with air saturated with moisture, the turbinated vessels must be so far kept in control by the vaso-motor nerves, that no serum escapes. To-morrow, again, with an almost absolutely dry atmosphere, under the action of the vaso-motor nerves, the blood control is unlocked, as it were; the turbinated vessels are so charged with blood that the current becomes active, and the amount of serum poured out on the mucous surface of the nasal cavity is such as to thoroughly saturate the ingoing current of air with moisture, and still not impair the consistence of the blood flowing through the vessels. This control must be so delicately exercised as to meet not only daily, but even momentary changes in the humidity of the inspired air. It is easy to see, therefore, how great the demand must be upon the vaso-motor nerves which regulate the calibre of these blood-vessels, how constant the watchfulness which controls this exosmotic action, and therefore how easily any impairment of this function might occur."

These views were based on the result of many years of clinical observation of this membrane, both in health and disease.

From an anatomical point of view, it is difficult to understand why nature should have placed in these passages the somewhat intricate and complex mechanism which we there find, unless it was designed to subserve some important purpose. That this purpose is not connected with the function of phonation or olfaction, I think cannot be questioned. We must then conclude that its design is connected with the function of respiration—a view which I think can alone be entertained after the investigation of the anatomy of

the membrane already made. We can only conclude, therefore, that this most intricate and delicate apparatus is designed to serve the function already described, of serous exudation.

The special method by which this serous transudation takes place we are scarcely ready to describe, though a very important suggestion comes to us from the notable observation of Chatellier.<sup>1</sup> He describes certain minute canals, running at right angles to the mucous membrane, penetrating to the lymph channels. Chatellier makes the suggestion that these canals serve the purpose of serous channels. The question arises, whether Chatellier's canals may not be the tubular mucous glands of Zuckerkandl.

As before stated, these observations were based entirely on clinical study of the respiratory tract both in health and disease, continuing through a number of years. They have, however, since my views were first published, been confirmed in a very striking manner by Aschenbrandt's<sup>2</sup> exhaustive experiments, in which data of a sufficiently definite character are given to establish all of my conclusions.

Aschenbrandt's experiments were conducted in the Physiological Institute of Professor Fick, of Wurzburg, and in the following manner: An air aspirator, with a capacity of five litres (five and a quarter quarts), is attached to one of the nostrils by means of a glass tube, in which a thermometer is fixed in such a manner as to register the temperature of the air immediately upon its exit from the nose. One litre (quart) of air is passed every six seconds, each experiment being finished in thirty seconds. In a large number of experiments Aschenbrandt found, that with the temperature of the air in the room varying from 8° C. (46.4° F.) to 12° C. (53.6° F.), the temperature of the air as it passed from the nose did not vary from 30° C. (86° F.). Now the temperature of the expiratory current in ordinary respiration is 30° C. (86° F.), which shows conclusively that the warming of the air in respiration is done exclusively by the nose.

Experiments were also made as to the amount of moisture in the expired air, and were conducted with the same apparatus. He found that each five litres (five and a quarter quarts) of expired air contained 0.18 gramme (2.77 gr.) of water, which constitutes complete saturation, and furthermore, that the whole amount withdrawn from the body in twenty-four hours was 500 grammes (7715 grs.), and that the source of this, therefore, was in the nose. A still further conclusion was drawn from these experiments, that all

<sup>1</sup> *Annales des Mal. de l'Or.*, etc., No. 6, June, 1887.

<sup>2</sup> "Ueber die Bedeutung der Nase im Respiration," Wurzburg, 1886.



mechanical dust is completely arrested during inspiration, and is deposited on the moist surfaces of the nasal membrane.

Subsequent to Aschenbrandt's observations, Kayser<sup>1</sup> made a series of investigations in the same line. He made use of the same aspirating bottle as Aschenbrandt, and the thermometer-tube fitted into the nostril was essentially the same. In Aschenbrandt's investigations, however, the upper pharynx was not shut off, and hence warm air could be drawn from the mouth out through the nose, by the aspirator, and thus vitiate the experiment. To obviate this source of error, in Kayser's experiments the palate is held up by a spatula, after the application of cocaine, and the upper pharynx and nose shut off completely from the lower pharynx and mouth. The temperature of the air after passing through both nostrils, five litres (five and a quarter quarts) in thirty seconds, was found to be the same as in Aschenbrandt's experiments, 30° C. (86° F.), when the temperature of the inspired air was 12° C. (53.6° F.); with an external temperature of 0° C. (32° F.) to -4° C. (24.8° F.), the temperature of the expired air was 27.5° C (81.5 F.). If the temperature of inspired air was 19° (66.2° F.) to 20° (68.7° F.), the expired air was 32.3° (90.1° F.) to 33.5° (92.3° F.).

For testing the heating power of one nostril, instead of passing a tube through the mouth behind the palate, closing one nostril, and aspirating through the other as Aschenbrandt did, Kayser passed a caoutchouc tube through the inferior meatus of one side, the posterior end of this tube passing beyond the choana; the anterior end was fitted closely into the nostril by means of a rubber cork. The apparatus for aspiration and determining the temperature was then fitted to the other nostril. It is easy to see that by this means the heating effect of only one nasal cavity was obtained. The palate was held up as in the preceding experiment.

In this experiment Kayser differs somewhat from Aschenbrandt, for while Aschenbrandt found that the air was heated just as much in passing through one nasal cavity as through both, Kayser found that it was heated about 0.5° C (0.9° F.) less. Variations in external temperature made the same difference in the expired air as in the first experiment.

Kayser also performed a series of experiments for the purpose of finding how much the air was warmed in oral breathing. A caoutchouc tube was passed through the inferior meatus of one side to the choana, and the opposite nostril closed with the finger. The tube containing the thermometer was fitted into a cork, and held between the lips. The aspiration was then performed in the

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<sup>1</sup> Pflüger's Archives, vol. xli., 1887, pp. 127-47.



usual way. It was found that the air was heated almost half a degree less than in passing through both nostrils.

For determining the amount of moisture in the air after its passage through the nasal chambers or mouth, the thermometer-tube was replaced by a U-tube containing pumice-stone and sulphuric acid. The increase in weight of the tube at the end of each experiment enabled him to calculate the amount of water contained in the expired air. As a result of these experiments he found that in its passage through the nose or mouth, the air was completely saturated with moisture.

The above experiments, as originally suggested by Aschenbrandt, were intended to approximate, as nearly as possible, the conditions of normal respiration, the tidal air being taken as five hundred cubic centimetres, and the respiration rate as twenty. In thirty seconds, then, five litres (five and a quarter quarts) of air would pass through the respiratory passages. Kayser points out that at least half the time is consumed by expiration and repose, and consequently in the experiment the air has been allowed to remain in the nose and mouth at least twice as long as it does in normal respiration. He, therefore, repeated all of the above experiments, regulating the aspirator so that five litres (five and a quarter quarts) would pass in fifteen seconds instead of thirty seconds. He found, however, that this increased rapidity did not notably influence the result, either with reference to temperature or saturation.

To simulate as nearly as possible the conditions found in the trachea and bronchi, Kayser made use of a glass tube, of such a length and diameter that its area was about equal to that of the trachea and larger bronchi. This tube was lined with filter paper saturated with water. A thermometer was fixed in this tube so that its temperature could always be determined, and the temperature was kept constant by enclosing it in a hot-air bath. One end of the tube was left open, the other was connected with the tube containing a delicate thermometer, the same apparatus, in fact, used in the preceding experiments for determining the temperature of the expired air. Here he found that lowering the temperature of the air before aspiration, made considerable difference in the temperature of the air after aspiration, and that doubling the rate of aspiration also exerted an influence upon the temperature and moisture of the air after aspiration.

For the filtering out of mechanical dust, Kayser claims that Aschenbrandt's investigations are not conclusive, since with the apparatus with which the experiment was made, very little dust could get into the nose at all. He consequently improved the ap-

paratus, using a glass globe with three openings. One of these communicated with a bellows used to agitate finely powdered magnesia, the second was open to the air, the third was connected with a glass tube fitting tightly into one nostril. A similar tube connected with the aspirator was fitted to the other nostril. If now aspiration is conducted in the usual manner, and at the same time the dust is agitated by the bellows, Kayser finds that dust can still make its way around into the nostril connected with the aspirator, thus proving that the nose is not a perfect filter for mechanical dust.

Kayser makes the further observation, that when cold air is inspired through the nose, there is a notably increased blood supply in the turbinated bodies, thereby increasing their heating capacity. In this connection he suggests that in tracheotomy the inspired air in summer must be of a temperature of  $30^{\circ}$  ( $86^{\circ}$  F.) to  $35^{\circ}$  C. ( $95^{\circ}$  F.), and in winter of  $25^{\circ}$  ( $77^{\circ}$  F.) to  $28^{\circ}$  C. ( $82.4^{\circ}$  F.), and in each case must be saturated with moisture in order not to produce bronchial irritation; the reason being that the bronchial membrane is not endowed with a special apparatus for moistening and heating the air.

It will be noticed that Kayser makes no definite statement as to the amount of moisture poured out by the venous sinuses of the nose in the twenty-four hours. Aschenbrandt, however, makes the statement that the whole quantity of water, which the air in respiration draws from the human body, amounts to about 500 grammes (7715 grs.) in the twenty-four hours, and this is taken from the mucous membrane of the nose. This observation, however, was scarcely necessary, since the amount given in my original paper, as from twelve to sixteen ounces, is the amount given by all physiologists as the amount taken from the lungs. Both Aschenbrandt and Kayser, however, make the definite statement that all the air which passes to the lungs through the nose is in a state of saturation. Of course, saturated air passing in and out of the lungs, takes absolutely no moisture from the bronchial mucous membrane. The general accuracy of these results has received still further confirmation, in a series of experiments by Bloch,<sup>1</sup> who reaches, practically, the same conclusions as Aschenbrandt and Kayser, with the exception, that he finds that the expired air reaches only to two-thirds of the saturation point, and that the heating capacity of the oral cavity is inconsiderable. Clinical observation, I think, should add sufficient weight to the accuracy of the earlier experiments, to practically establish the truth of their teaching.

The proposition is proven beyond question, as previously stated

<sup>1</sup> "Archives of Otolary," vol., xvii. No. iv.; vol. xviii., No. i.

by myself, that the sole source of moisture is in the nose. I think we may declare it as an established truth, that the function of the so-called erectile bodies is serous transudation, and that they are designed to subserve no other function in the economy.

The observers already quoted have made allusion to the fact already generally accepted by physiologists, that the air in passing through the nose is cleansed, in that floating particles of foreign matter lodge against the moist and tortuous surfaces. Probably, however, this is an adventitious function; certainly it is a very unimportant one. I have never regarded the bronchial mucous membrane as subject to any serious danger from floating particles of foreign matter making their entrance with the inspired air. In seeking for a proper function to assign to these falsely called erectile bodies of the nose, the assertion has been made, notably by John Mackenzie, that they are designed to swell up and thereby close the nasal passages to prevent the entrance of foreign bodies. This observation, it has always seemed to me, was based on the original mistaken idea that the turbinated bodies were erectile tissue; and, therefore, their function was to become erect. I think it has been demonstrated that these bodies are not erectile tissue. Furthermore, they never become erect in health or disease. Certainly, if nature intended that they should swell out, and thereby occlude the nasal passages to prevent the entrance of foreign bodies, thus compelling the opening of a far more vulnerable tract through the mouth, nature has been guilty of an awkwardness of design which presents no analogy in the whole human economy.

## CHAPTER VII.

### GENERAL CONSIDERATIONS CONCERNING CATARRHAL DISEASES.

THERE are so many misconceptions in regard to what is ordinarily called "nasal catarrh," not only among the laity, but also to no small extent among professional men, that it seems wise here to discuss, in a somewhat general way, certain questions connected with this subject. Perhaps the most prevalent misconception in regard to nasal catarrh is that it is a special disease of the nasal cavity, which leads ultimately to ulceration of the soft parts with necrosis of bone. This view is the one largely encouraged in the advertisements of proprietary remedies for the cure of this affection. It scarcely needs to be stated here, that a simple catarrhal inflammation is always a catarrhal inflammation from its onset, and never results in anything more than a simple hypertrophy of the tissues. Ulceration and necrosis belong to syphilis or some other of the constitutional dyscrasiæ alone, and bear no relation whatever to the inflammatory process. Another somewhat prevalent idea, entertained both by the medical men and the laity, is that there is a catarrhal diathesis, a peculiar systemic condition, under the influence of which a patient becomes especially liable to catarrhal inflammation, which may attack indifferently any of the mucous membranes of the body. We not infrequently hear a patient making the statement that all his mucous membranes are weak, and that an inflammation of the mucous membrane, say of the air tract, is liable to be followed by a similar weakness of the intestinal tract, or possibly of the genito-urinary tract. I know of no good ground for this assertion. Certainly, my own clinical experience, which has been somewhat large, fails to justify this view in any manner. The mucous membranes of different portions of the air tract are in exceedingly close sympathy, and a morbid process in one portion is very liable to be followed by a morbid process in another part of the tract, but that there is any sympathy or connection between the mucous membrane of the air tract, and the mucous membrane of the food tract, I do not believe to exist.

There are many who honestly entertain, and many who dis-



honestly encourage the idea, for commercial purposes, that a simple catarrhal inflammation of the upper air tract has a tendency to lead to the development of pulmonary diseases. Thus, I find so excellent an authority as Beverley Robinson<sup>1</sup> making the statement that "undoubtedly the patient affected with long-standing follicular disease of the naso-pharyngeal space, sooner or later develops this same follicular disease of the remaining portions of the respiratory tract; of the pharynx at its middle and lower portions first, then of the larynx and finally of the bronchial tubes. Hence comes, I am now thoroughly convinced, the initial stage in certain instances of what afterward develops into different forms of pulmonary diseases." A somewhat similar view is advocated by Jarvis.<sup>2</sup> Notwithstanding such authority, I fail to find in Robinson's argument or Jarvis's report of cases, any clinical evidence in substantiation of this view. Possibly, a patient with a family history of phthisis, is more liable to fall a victim to this disease with a bad chronic catarrhal affection of the upper air passages, than if his upper air passages were in a state of perfect health, and yet even this assertion it would be difficult to establish on any grounds of clear, clinical observation. I think, therefore, that we must content ourselves for the present certainly, with the view that a chronic catarrhal disease of the nose or naso-pharynx tends to the development of a process of a similar character in the larynx, trachea and bronchial tubes, but nothing further. In other words, the tendency of a catarrhal inflammation is to extend downward, but it remains a catarrhal inflammation always. The worst outlook, therefore, is in the development of a chronic bronchitis with asthma, excluding cases of purely nervous asthma, which while undoubtedly dependent on a rhinitis or naso-pharyngeal catarrh, are not directly the result of it, but only occur in connection with the peculiar neurotic habit. This question, however, is more fully discussed in the chapter devoted to the subject of asthma.

The word catarrh is derived from two Greek words *κατὰ* *ρεῖν*, which translated mean "to flow downward," the name being given primarily to a disease of the upper air passages in which the prominent symptoms seemed to be a flowing down of the mucus or muco-pus. In this manner, this term "Catarrh" came to be used as designating all diseases of the nasal passages which were characterized by an abnormal discharge, including tumors, syphilis, scrofula, ozæna, as well as the simple chronic forms of rhinitis. If we translate the word and use it as meaning simply a discharge, I think we obtain a true estimate of its proper scope. A patient who suffers,

<sup>1</sup> "Nasal Catarrh and Allied Diseases," second ed., New York, 1885, p. 131.

<sup>2</sup> Trans. Amer. Climatological Assn., New York, 1886, p. 30.

therefore, with a chronic nasal catarrh suffers from a chronic nasal discharge, the one word being quite as definite as the other. This we understand may be the result of a large number of different diseases of the nasal cavity. We reach the conclusion, therefore, that a patient suffering from nasal catarrh really has some diseased condition of the upper air tract. What this condition is, simply remains for us to determine by the improved diagnostic methods of the present day. A somewhat later use of the term was that first described, I think, by Virchow, who restricted it to the designation of a particular form of inflammatory action taking place in mucous membranes, which he termed a catarrhal inflammation, namely an inflammation which was characterized by the pouring out upon its surface of a secretion which was fluid in character, in contradistinction from a croupous and diphtheritic inflammation, in which the material poured out on the surface contains largely of fibrin and therefore coagulates, thus forming a false membrane. This use of the term catarrh is the one which alone should find place in medical literature. In this manner we obtain a definite classification of the diseases affecting mucous membranes, in that when we speak of a chronic laryngitis or a chronic rhinitis, we mean a chronic catarrhal inflammation, and when allusion is made to a croupous or diphtheritic inflammation of these parts, we specify this form in including the term croupous or diphtheritic. We reject, therefore, entirely, the use of the word catarrh, and in place of it adopt that nomenclature which designates the character of the inflammation and the region involved, and simply regard catarrh as a symptom of any of the many diseases which may affect the upper air tract.

A very prevalent idea in regard to catarrhal inflammation is that its prominent symptom is excessive secretion, either of normal mucus or of muco-pus. This is rather a nice question to determine in hypertrophic rhinitis. It is altogether probable that this apparent excessive secretion is really a diminished secretion. In health the nose secretes probably a pint of serum, which becoming mingled with the normal mucous secretion, disappears, without the patient being conscious of it, by evaporation, the water being taken up largely by the inspired current of air. In diseased conditions the amount of serous exudation is not infrequently diminished as the result of hypertrophy, and therefore the mucous secretion not being diluted with this large amount of serum, become thick and inspissated. A pint of healthy sero-mucus, secreted by a healthy membrane, does not make itself felt. Diminish the serous exudation one-half, and we have seven or eight ounces of secretion from which the limited amount of water is taken up rapidly; hence we

will find an inspissated mucus which makes itself felt, and gives rise to unpleasant symptoms. In atrophic rhinitis the exosmosis of serum is more or less completely abolished. The whole secretion of the mucous membrane is confined to a mucus, largely surcharged with epithelial cells, giving rise to a muco-purulent discharge, which is dried up by the ingoing current of air, thus resulting in the formation of masses of dried mucus or crusts. We have here a very marked diminution of secretion, and yet apparently an excess, in that every portion of the limited secretion manifests itself in the form of green crusts, which give rise to unpleasant symptoms. In a naso-pharyngeal catarrh we have an apparent excess of secretion. The vault of the pharynx contains glands in health, whose function is to pour out mucus for lubricating the bolus of food, and thus facilitate its passage to the stomach. The normal secretion from this region in health is large, but it is a thin fluid, and passes into the pharynx in even large quantities without the individual being conscious of it. In a diseased condition of the naso-pharynx, the secretion becomes impaired, and undoubtedly notably diminished, certainly in its watery constituents. It is this change into a muco-pus, which while apparently secreted in large quantities, remains a thick tenacious mass of mucus adhering to the mucous membrane lining the pharyngeal vault, in such a manner that the patient expels it with the greatest difficulty; and hence its presence becomes a source of exceeding great annoyance. The same I think we may say of the larynx and trachea in simple chronic laryngitis and tracheitis, which I regard as almost invariably secondary affections to diseases of the nasal passages. The tract above failing to do its proper duty of warming and moistening the inspired air, the parts below are subjected to the influence of an abnormally dry current of air in respiration, under the action of which the normal mucus is robbed of a certain proportion of its watery constituents, and becoming thick and inspissated, proves a source of irritation, and is expelled with a certain amount of difficulty. These diseases are not characterized by an excess of secretion but by a diminution of secretion. We are thus led to the view that it is an entire mistake to regard excessive secretion as the prominent feature of a chronic catarrhal inflammation. A proper appreciation of these diseases will be better obtained, I think, when we clearly understand in just what manner a chronic catarrhal inflammation interferes with the very important functions which these parts are designed to subserve. This question is more fully discussed in a later chapter. I have tried to make clear that a nasal catarrh, so-called, means nothing more than that there is some diseased condition of the nasal passages. In treating such a case our first duty is



to make a careful examination of those passages to determine what special morbid condition exists there to give rise to such symptoms as present. A discharge from the nose anteriorly is somewhat uncommon. We should understand that in what is called an ordinary catarrh, viz., a liability to cold with more or less obstruction to nasal respiration, together with a tendency to accumulation of thick mucus in the fauces, we have to do, usually, with either hypertrophic rhinitis or a naso-pharyngeal catarrh, and these are not infrequently complicated with a deformity of the nasal septum. We have here the three prominent conditions which give rise to an ordinary mucous catarrh so-called. These three conditions are somewhat intimately associated in most cases, and it is by no means easy to determine just where the morbid lesion lies. Certainly the nasal cavity and naso-pharynx react upon each other in a very intimate manner. I am disposed to think that in most cases a naso-pharyngeal catarrh is dependent primarily on hypertrophic rhinitis, and that an attempt to deal with it is unsuccessful until the hypertrophic rhinitis is brought under control. Furthermore, the hypertrophic rhinitis in the large majority of instances is dependent upon a deformity of the septum. We have here, therefore, two lesions to remove before we can successfully attack the naso-pharynx. Furthermore, it is by no means easy to recognize by the closest rhinoscopic inspection, what constitutes the morbid lesion in a naso-pharyngeal catarrh. Hence we are compelled to remove the disease of the nasal passages first, in order to determine that the naso-pharyngeal disorder is not entirely dependent upon the nasal. These questions are mainly suggested here as illustrating some difficulties in diagnosis, and of course will be discussed at length in the chapters devoted to their consideration. Furthermore, it may be noted that the idea that a hypertrophic rhinitis gives rise to discharge from the nostril is altogether mistaken. It is altogether probable that the perverted mucus which accompanies the disease, makes its way largely into the pharynx, and we thus find that a faucial catarrh, often spoken of as a pharyngitis, follicular disease of the pharynx, sore throat, etc., is really a disease of the nasal cavities, and in most instances of the mucous membrane covering the turbinated bones.

The character of the discharge, whether anteriorly through the nostrils, or through the posterior nares and the fauces, is always something of an indication of the form of disease with which we have to deal. A purely watery discharge usually indicates a vasomotor disturbance, such as hay-fever or nasal rhinorrhœa. A profuse sero-mucous discharge in which the serum is more or less charged with flakes of grayish mucus, is characteristic of nasal polypi. It also occurs in the second stage of acute rhinitis. A



thick mucous discharge containing flocculi of whitish mucus, and rendered opaque by a moderate mixture of young cells, may occur in connection with hypertrophic rhinitis, but is usually indicative of a disease of the naso-pharynx. This occurs more especially in young children suffering from adenoid vegetations of the pharyngeal vault. A thick whitish mucus discharged into the fauces, which is drawn down by a nasal screatus, and expelled by hawking, is characteristic of either hypertrophic rhinitis or naso-pharyngeal catarrh. A purulent discharge composed of masses of somewhat thick yellow pus, attended with something of an odor, should always call attention to the probability of the existence of suppurative disease of one of the accessory sinuses, usually the antrum in an adult. A similar form of discharge occurs in the purulent rhinitis of childhood, and in the last stages of acute rhinitis. A purulent discharge through the nostrils, mixed with shreds of necrotic tissue and blood, and also with offensive crusts, indicates the existence of ulceration and probable necrosis, and should always suggest syphilis, although small crusts detached from just within the margin of the nostril may be discharged from slight erosions of the septum. The discharge of greenish crusts, in connection with somewhat healthy looking pus, or muco-pus, in connection with a mild offensive odor, the crusts being bright yellow or greenish in color, and containing neither blood nor necrotic tissue, should suggest the existence of atrophic rhinitis.

## CHAPTER VIII.

### ACUTE RHINITIS.

ACUTE rhinitis is an acute inflammation of the mucous membrane lining the nasal cavities proper, which may confine itself entirely to these passages or, as not infrequently happens, it may extend to neighboring passages, as the pharynx, larynx, and the air passages below, as well as in a mild degree to the accessory cavities, such as the frontal sinus, the antrum of Highmore, and also the Eustachian tube. This tendency to extension, however, it should be stated, is not a characteristic of the earlier attacks of acute rhinitis, but only occurs, as a rule, in those who are accustomed to take cold easily on slight exposure and are frequently subject to these attacks; each successive attack being to an extent of a more aggravated character and also showing increased disposition to extend to the passages below, so that, whereas the earlier attacks were confined to the cavity of the nose alone, the subsequent attacks, years later even it may be, show a disposition to extend downward, as it is said, thus giving rise to a laryngitis, or an ordinary winter-cold. As this habit increases, and only as it becomes a habit, do we find these processes reversed, and as a result of exposure the patient now commences to have attacks of laryngitis and bronchitis which show a disposition to travel upward, resulting later in an attack of acute rhinitis. The original seat of trouble in all these cases is to be found in the nasal cavities.

ETIOLOGY.—It is ordinarily stated that an acute rhinitis is the result of exposure to cold and this is undoubtedly true, but behind this is a very prominent predisposing cause in an already existing chronic inflammation of the nasal mucous membrane, the chronic morbid process preceding the acute process, and rendering the patient especially liable to the occurrence of an exacerbation on slight exposure. It is often stated that cold in the head may arise from the inhalation of acrid vapors, and also that it occurs as the result of a peculiar idiosyncrasy which renders the nasal mucous membrane particularly susceptible to certain odors, such as ipecac and iodine. I am disposed to question whether what occurs in these cases is a genuine attack of acute rhinitis, and am rather disposed

to think it is a temporary disturbance of the great respiratory function of the nose, giving rise to what has been called an influenza, or what in its aggravated form constitutes hay-fever or rose-cold, these affections giving rise to a morbid condition of the nasal mucous membrane which differs essentially from an acute rhinitis, as will be discussed more fully in the consideration of those diseases. Under the same category I should be disposed to place those rare epidemics which are recorded in history as having affected large portions of the population where they prevailed, such as that described by Anglade<sup>1</sup> as quoted by Mackenzie, in which an entire army was suddenly prostrated with the disease; or the great epidemic of 1762<sup>2</sup> in which the type of the disease was so severe as to cause a mortality of two per cent. It should also be borne in mind that the internal administration of iodides is liable to produce nasal symptoms closely resembling those of acute rhinitis. It, however, is not attended with any observable constitutional symptoms. Moreover, its action is limited to the production of turgescence of the blood-vessels with watery discharges. In these cases, the morbid process manifests much the same symptoms and runs much the same course as an ordinary attack of acute idiopathic rhinitis.

In general then, we may say of this affection that it is caused by exposure to cold, in the manner already so fully discussed in the chapter on taking cold as to render any discussion of the subject here unnecessary. Acute rhinitis also occurs at the onset of certain of the exanthemata, such as measles, typhus, typhoid, erysipelas, etc.

**SYMPTOMATOLOGY.**—The attack is not usually ushered in by chill, but rather by chilly sensations, a feeling of lassitude and general malaise, followed by a mild febrile condition with pains in the muscles and loss of appetite. These symptoms, as a rule, however, are not well marked, and the patient's attention is first called to a sense of stuffiness about the frontal region, with burning or prickling sensation in the nose, with dryness and heat. This may last a few hours or more, when there sets in a watery discharge of a somewhat acrid character, which gradually changes to a mucous discharge, more or less copious in amount. This, in time, leads to a free discharge of a muco-purulent character. The dryness of the membrane, which characterizes the onset of the attack, is coincident with the stage of congestion and arrest of secretion which mark the commencement of any acute inflammation of a mucous membrane. Following this, there occurs a free transudation of liquor sanguinis from the en-

<sup>1</sup> "Sur le Coryza simple," Thèse de Paris, 1837.

<sup>2</sup> "Encyclop. Brit.," vol. xiii., 9th ed., p. 73.

gorged blood-vessels, which goes to make up the more or less profuse serous or watery discharge which constitutes the main portion of the secretion which characterizes the second stage of the attack. The normal glandular structures of the membrane are soon stimulated into an excessive and morbid activity and a profuse discharge sets in, consisting of clear, transparent mucus, together with an admixture of epithelial cells and leucocytes and perhaps a few red blood-corpuscles. As the inflammatory process develops, the normal nutritive processes of the membrane are stimulated to an excessive degree, epithelial cells are generated with increased rapidity, and the discharge assumes a muco-purulent character, being thick, yellow and turbid, the color and consistency being entirely due to the very large number of young, unripe cells which become incorporated with the discharge. The nasal cavity proper is so far the seat of most of the symptoms, these being mainly confined to a sense of discomfort referable to the nose, increased secretion, a sense of fulness or complete closure of the passages due to the swelling of the membrane, together with frequent and often distressing attacks of sneezing. If the frontal sinuses are involved, the attack is attended with frontal headache, oftentimes of a distressing character. This is not due, necessarily, in every case to an extension of the inflammatory process, but rather to the congestion of the mucous membrane lining the cavity, with pressure upon the nerves. In many cases, there is marked irritation of the conjunctiva, together with overflow of tears. This is undoubtedly due to obstruction of the tear-duct, the swollen mucous membrane of the lower turbinated bone pressing against and occluding the orifice.

That this can occur I do not question, although Dr. Allen,<sup>1</sup> in discussing this matter, maintains that the closure of this duct cannot occur except as the result of atrophy, osteitis, or necrosis.

The orifice of the antrum of Highmore is often closed, giving rise to a sense of fulness and stuffiness, and oftentimes severe neuralgic pains referable to that region, although fortunately the diseased process rarely extends in its activity to this cavity. When this does occur, however, we have a condition of things of somewhat grave import. This, however, will be discussed in a subsequent chapter.

Obstruction of the Eustachian tube, giving rise to deafness, and not infrequently, ringing in the ears, is not an unusual symptom, this being due merely to obstruction, and not to any extension of diseased action, although a direct extension of the inflammatory process to the middle ear, giving rise to acute middle ear disease, is one of the accidents which may occur.

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<sup>1</sup> "Relation between Nasal Catarrh and the Closing of the Lachrymal Duct," *Philadelphia Medical News*, February 6th, 1886.



As has been already stated, the tendency to extension of the inflammatory process to the accessory cavities is very limited, but this is not true of the pharyngeal vault, for the membrane here, I think, is in all cases in a state of mild acute inflammation, the mucous membrane proper being swollen, while the glands, which constitute the pharyngeal tonsil, are stimulated to an excessive activity. This is further aggravated by the fact that their normal function is interfered with, which, as has been already stated, is largely dependent on a healthy functional activity of the nasal mucous membrane; for, during an attack of acute rhinitis, the normal mucous secretion is not swept over and diluted by the moisture-laden vapor of the inspired current of air, it therefore becomes thick, viscid, and inspissated, and so accumulates in the pharyngeal vault, hindering the normal function of the palate, preventing the renewal of air in the middle ear, and increasing the obstruction of the orifice of the Eustachian tube, and giving rise to marked faucial irritation.

The sense of smell is generally lost for a time, and as a consequence also the sense of taste, this being due mainly to the fact that the odoriferous particles are entirely excluded from the olfactory region. The integument about the orifices of the nostrils is liable to become inflamed, as a result of the irritating qualities of the discharge, which contains largely of saline matter, a condition which is undoubtedly aggravated by the frequent use of the handkerchief to which the sufferer is obliged to resort.

DIAGNOSIS.—The recognition of an acute rhinitis should be based on the same general rules which govern us in the recognition of an inflamed mucous membrane in any portion of the body. An inspection in the first stage reveals to us the mucous membrane covering the turbinated bones in a red and swollen condition, the color being of a distinctly bluish-red or venous tinge, while the surface of the membrane presents a dry and somewhat glazed appearance. The nasal cavity is, of course, largely encroached upon by the swollen membrane, and a deep inspection, therefore, is not easily obtained.

During the second stage, we have the color of the membrane notably changing its aspect. It now presents a brighter, more rose-colored tint, somewhat more nearly approaching the arterial color, while its surface is bathed in a profuse discharge of clear, white, watery serum. The deeply-red, highly-turgid appearance which characterizes the first stage has changed notably, the membrane seems less swollen and less highly distended.

In the third stage, a still further change is noted. As the secretion becomes surcharged with the rapid desquamation of epithelial cells, it assumes a bright yellow color, is notably less in amount, and is of a somewhat thick and viscid character. The membrane

beneath it still presents the appearances of active acute inflammation, being swollen in contour and of a bright red color, the normal lumen of the cavity being greatly encroached upon, the tissues over the middle turbinated bone being in contact with the septum almost invariably, and in most cases the same condition existing in the lower meatus.

An examination by posterior rhinoscopy shows each posterior naris more or less completely blocked by the swollen membrane of the lower and middle turbinated bones, their gross appearance on inspection corresponding to that of the membrane seen in front, in the different stages of the disease. The vault of the pharynx will be found to contain a large mass of thick, yellow, inspissated mucus, adhering to the crypts of the pharyngeal tonsil, while the membrane surrounding the Eustachian orifice is reddened, but rarely swollen. The lower pharynx oftentimes presents a dry and glazed appearance, due to the habitual mouth-breathing which results from the obstruction of the nasal passages. It may be somewhat reddened as the result of this irritation, but is not, as a rule, in a state of active inflammation, not being a part of the air-passages. It is true of the acute form, as well as of the chronic form of inflammation of these regions, that it confines itself to the physiologically associated tracts, and in extending down, it passes immediately from the nasal passages to the larynx and trachea.

When the larynx and trachea are involved, they present the same appearances as are found in ordinary sub-acute catarrhal inflammation of these regions.

PROGNOSIS.—The prognosis in this disease is favorable. It involves no danger to life and will run its course, as a rule, in about seven days without interference, leaving behind it probably, however, an aggravation of the chronic condition which undoubtedly underlies and is the most prominent predisposing cause of the acute inflammation.

It is understood, of course, that this statement applies to those cases where the accessory sinuses are not involved, and in which there are no aural complications.

PROPHYLAXIS.—Those who are especially liable to take cold should exercise additional carefulness in the avoidance of those causes which experience teaches them may give rise to an attack of acute rhinitis. Yet, an excessive zeal in this direction is always to be avoided, since that over-carefulness for one's health which results in muffling the head and neck with too much covering, leads to an oversensitiveness of the parts, by which the liability to take cold is much increased. It is not well, as a rule, to wear thick wraps about the neck and head, unless it becomes absolutely necessary as a matter of

comfort. It must be borne in mind that exposure to low temperature alone is not sufficient to produce a cold. It is a draft of damp air, usually of a mild temperature, which causes the mischief. The proper regulation of clothing is of the utmost importance, but it is always a mistake to wear more clothing than is absolutely necessary, as has already been stated. Furthermore, an equable distribution of clothing over the body should be the inflexible rule. We do not protect the throat by wrapping the neck; we weaken it. Exposure from wearing thin shoes never gives rise to cold in the feet. A chest-protector does not protect the chest. In fact, we do not protect ourselves from taking cold in our climate by exceeding carefulness in dress. We can only endure with impunity the changes and rigors of our changeable seasons by inuring ourselves to them. There are few measures of greater value as a preventive of colds than the daily use of a cold plunge bath. This not only acts to keep the emunctory functions of the skin in a healthy state of activity, but also serves to harden the parts, as it were, and thus render them less susceptible to the action of cold. This, however, is a measure that we cannot recommend in all cases, for the shock to the heat-producing force is too great in some cases. To those, however, who can take a daily cold bath it is not only a luxury, but a valuable sanitary measure. If, however, the cold plunge is not feasible, sponging the body with cold water to the waist every morning is a measure of undoubted benefit. Of more importance still as a preventive measure is the removal of that condition which, it has been already suggested, is the predominant, predisposing cause of acute rhinitis, namely a chronic rhinitis. Perhaps no fact has been more strikingly noticeable in my practice than the rarity with which patients take cold after commencing treatment for a chronic rhinitis, even the limited improvement secured by one or two applications being sufficient to control this tendency. Too much stress, cannot be laid on the fact, that in all cases the habit of taking cold means a chronic rhinitis, although this may be of so mild a character as to give rise to no marked symptoms, other than this special susceptibility to cold.

TREATMENT.—An attack of acute rhinitis may often be aborted if measures are resorted to for the accomplishment of this purpose sufficiently early. This must needs be done very soon after the first local symptoms show themselves, and, as a rule, before the copious discharge of watery serum has set in which marks the second stage of the attack. This plan consists in the administration of from five to ten grains of quinine, followed by some warm drink, such as chamomile-tea, or a hot lemonade, with the addition perhaps of a hot foot-bath. The object of this, of course, is to produce copious perspira-



tion and thus restore the normal heat which has been lost, and to re-establish a proper equilibrium between heat-production and heat-waste. If there is much pain over the forehead and neuralgic pain in the face, due to the involvement of some one of the accessory cavities, ten grains of Dover's powder may be given with advantage, both to relieve the pain and aid in producing diaphoresis. A popular measure to break up a cold and one much resorted to is the Turkish bath. Now, a Turkish bath is a pleasure and a luxury in health, but I seriously question if its advantages are not very greatly overestimated as a remedial agent. Certainly in inflammatory affections of the air-passages, and especially those of an acute character, I believe this resort to be one capable of doing great mischief. The hot room of the bath is unobjectionable while it lasts, but the necessary exposure of the sponging room and the rubbing room so much over-weighs its advantages, that a cold is more liable to be aggravated than benefited by this method. A still further danger is the exposure which one undergoes necessarily, on leaving the bathing establishment after the profuse perspiration. This danger is obviated, and the good effect of a hot bath secured by the excellent suggestion of Cohen,<sup>1</sup> who recommends that the patient be given a hot air-bath immediately before retiring, by wrapping himself in a warm flannel sheet and sitting in a chair under which an alcohol-lamp is placed. The bath should last from fifteen to twenty minutes. A profuse perspiration is usually the result, and the patient is to wrap himself in the same blanket and retire to his couch. It is also recommended that he take some warm drink, such as hot lemonade, immediately after the bath, and a pitcher of water be placed by his side and that he drink as freely of this as he may desire, although this is contrary to the somewhat curious suggestion of Lower and Williams, that a cold may be aborted by complete abstention from the use of water until the symptoms abate. I have never known this procedure to be put in practice successfully. Cohen also advises as an abortive measure the administration of chloroform, although he fails to satisfactorily explain the rationale of its employment. Possessing, as we do, simpler and more efficient remedies, I should hesitate to embrace this suggestion.

The early administration of opium presents a remedy of undoubted efficacy in mitigating the severity of the attack, and oftentimes in completely aborting it. This measure, which belonged to the practice of the olden times, receives the indorsement of Mackenzie<sup>2</sup> who gives preference to the use of the tincture of opium,

<sup>1</sup> "Diseases of the Throat and Nose," First ed.

<sup>2</sup> Loc. cit., vol. ii., p. 291.



advising that it be administered in doses of from five to seven drops on an empty stomach; this to be repeated, if necessary, at the end of six to eight hours. Lees,<sup>1</sup> while indorsing the administration of opium, expresses preference for the use of bromide of potassium combined with belladonna, which he administers to the extent of producing dryness of the fauces. Belladonna, in a somewhat different combination, is recommended by Beverley Robinson<sup>2</sup> who advises the use of the following powder:

℞ Pulv. fol. belladonnæ,	.	.	.	.	.	gr. xx
Pulv. morphiæ sulph.	.	.	.	.	.	gr. ij.
Pulv. gum. acaciæ,	.	.	.	.	.	ad ʒ ss.

A small quantity of this is to be thrown into the nose at intervals of three or four hours by means of an insufflator. Both Sajous<sup>3</sup> and Robinson advise the administration of small quantities of the tincture of aconite, in combination with some form of opium, when the fever is unusually high.

It is a very common procedure among physicians to confine their patients with a cold in the head absolutely to their rooms and oftentimes to the bed. I am by no means sure that this is wise in all cases. Confinement in the house certainly should be enjoined during inclement weather, but even in the height of an acute rhinitis I have frequently seen benefit result from a brisk walk in the open air in the middle of the day, when the sky is clear and the air not too cold. Confinement in bed I should deem unnecessary, unless the constitutional symptoms were aggravated, or some of the serious complications of acute rhinitis threaten, such as the involvement of the accessory sinuses, or an attack of middle ear disease.

The foregoing suggestions are made as specially indicated in the first stage of the disease, and before the discharges have set in, with the idea of arresting the further progress of the attack. Any of these measures may be resorted to in the second or third stages of the disease, but not probably with the result of more than curtailing the duration or the severity of the symptoms. In the later stages of the disease we have to deal with the vexatious element of excessive secretion, together with the nasal stenosis.

The prominent indication then would seem to be the use of astringents, and, as following this indication, we find recommended a long list of drugs, both in the liquid and solid form, which are supposed to possess astringent properties, such as tannin, zinc,

<sup>1</sup> Brit. Med. Journal, Feb. 13th, 1886.

<sup>2</sup> Loc. cit., p. 56.

<sup>3</sup> "Diseases of the Nose and Throat," Philadelphia, 1886, p. 68.

copper, alum, bismuth, etc. My own experience teaches me that these drugs possess but an exceedingly limited astringent power, if by an astringent we mean an agent which will limit and control excessive secretion. That these drugs do possess this power in a certain degree it would not be wise to question, when we consider that they have been maintained in practice from the earliest days of medicine. Without, then, especially recommending these remedies, they are simply offered as to a certain extent curtailing and diminishing the excessive discharge which characterizes the later stages of the disease. For this purpose there may be used, by means of some simple spray apparatus, a solution of tannin grs. xv. to the ounce; alum grs. v. to the ounce; sulphate of zinc grs. iij. to the ounce; nitrate of silver grs. ij. to the ounce. Or the same astringents may be used in the form of a powder incorporated in similar proportions with powdered starch, magnesia, or lycopodium. If nitrate of silver be used, its better administration would be in the same proportions incorporated with talc. Michel, of Hamburg, advises the use of this drug in the strength of one part in twenty. Another form in which the local use of drugs may be secured is by inhalation. Here we make use of the fact that certain drugs are volatilized by heat. Vapors, it should be stated, however, as a rule, can have but limited action on the mucous membrane of the nose in a state of acute inflammation, on account of the difficulty of thoroughly medicating the whole tract. The drugs which may be used in this manner are benzoin, lupulin, oil of tar, creosote, oil of pine, turpentine, camphor, etc. The method by which these may be used is either by one of the elaborate inhalators sold in the drug stores, or by the following device, which is much simpler and perhaps quite as efficacious. Place from one to four teaspoonfuls of any of the above drugs in an open-mouthed bottle, or even in an ordinary coffee-cup, and pour over it half a pint of water of about the temperature of 160°. This being held near the face the vapor of it is drawn in through the nose, or, if that is impossible, drawn through the mouth and expelled through the nose. Cohen recommends the vapor of iodine inhaled in the following manner. A few crystals of the drug being placed in a slender glass tube or quill, this is held in the hand, whose warmth is sufficient to cause a certain amount of volatilization and the vapor is then inhaled through the nostrils. The fumes of chloride of ammonium have, for a long time, enjoyed a well-deserved popularity, not only in the cases under consideration, but in all catarrhal affections of the respiratory tract. Their action, as I conceive it, is not to diminish secretion or limit the catarrhal process, but to stimulate the membrane to a certain extent, to dilute, as it were, the mucous discharge, and render its ex-

pulsion more easy of accomplishment by the patient. Perhaps also the stimulating action serves to relieve the distended blood-vessels in producing a freer serous exudation. In early times the volatilization of the salt was accomplished by means of heat. The result of this was a vapor composed of hydrochloric acid and ammonia. Lewin, of Berlin, however, devised an especial apparatus for the accomplishment of this purpose (see Fig. 50) the principle of which, has been imitated in the various devices which are sold in the drug-stores. The additional action of any of the volatile oils or resins mentioned above may be secured by adding them to the water of the third bottle in Lewin's apparatus. A remedy popular in Germany known under the name of Hager's remedy, is as follows:

R̄ Carbolic acid,	. . . . .	1 pt.
Strong alcohol,	. . . . .	3 pts.
Caustic ammonia,	. . . . .	1 pt.
Distilled water,	. . . . .	2 pts.

This to be used as an inhalation from an open-mouthed bottle. This has been indorsed by Brand<sup>1</sup> and is of undoubted value in giving relief to some of the distressing features of a coryza.

An old-fashioned household remedy for a cold consists in putting equal parts of vinegar and water on the stove, and thus charging the room in which the patient sits with the vapor of acetic acid. Following this idea, Fritsche<sup>2</sup> recommends the following:

R̄ Acidi acetici glacialis,	
Acidi carbolici,	. . . . . āā grs. ij.
Mist. oleo-balsamic.,	. . . . . grs. viij
Tinc. moschi	. . . . . gr. i.

This is to be used by inhalation from an open-mouthed bottle, or as a vinaigrette.

While these remedies possess unquestioned value in the treatment of the disease under consideration, we possess in cocaine a remedy, whose action is definite and absolutely certain in controlling what is probably the most distressing feature of the attack, namely, the venous turgescence. The peculiar action of cocaine on the blood-vessels has already been referred to and need not be entered upon here. I repeat, however, that in no case since I first observed this peculiar action have I ever failed to recognize its promptness and certainty in expelling the blood from the mucous membrane, whether in a normal state or in a state of inflammation. This action, however, of cocaine, lasts but three or four hours, when

<sup>1</sup> Berlin. Klin. Wochenschrift, 1872, No. 12.

<sup>2</sup> Ibid, 1887, No. 27.



it is followed by relaxation of the blood-vessels, not by a reaction, as has been claimed by many writers. The question arises, then, as to how far may we depend upon this drug to permanently control the acute inflammation of the nasal membrane under discussion, if repeated every four hours. My own experience teaches me that when the action of cocaine has exhausted itself, the blood-vessels do not return to their original highly distended condition, but that the relaxation is less marked, so that, if in an acute rhinitis we repeat the application of cocaine as soon as the patient experiences any sensation of recurring stenosis, we may eventually depend on very markedly curtailing the duration of the attack, if we do not completely arrest it and keep it under control. In cocaine, then, I believe that we possess a remedy whose value cannot, or should not be questioned, and the efficacy of which is far greater than that of any other single drug, and probably than those above-mentioned combined.

A favorite method of administration is as follows:

R	Cocainæ hydrochlor.,	.	.	.	.	.	grs. xx.
	Morphiæ,	.	.	.	.	.	grs. ij.
	Aquæ,	.	.	.	.	.	3 i.
Ft.	solutio et adde,						
	Cosmolini liquid.,	.	.	.	.	.	3 i.

This is to be used in the Burgess atomizer (see Fig. 47). The above prescription makes an excellent and fairly permanent emulsion, though, before using, it is well that the atomizer should be thoroughly shaken. An objection lies against the fluid cosmoline ordinarily sold by druggists in that it contains a considerable amount of the volatile oils of petroleum, notably the kerosene, which gives rather an unpleasant odor and taste to the mixture. A preferable oil, but not generally in the market, is the Voschano oil, which I believe is the Russian petroleum product.

The immediate effect of this application is an exceedingly agreeable and pleasant one, and if its use is continued, an ordinary cold in the head may be rapidly brought under control.

If the above mixture and apparatus are not available, an ordinary watery solution of cocaine acts as an excellent substitute. It is well, however, in applying the watery solution of cocaine, to bear in mind that, when the nose is in a highly sensitive state, its reaction is mildly acid. This may produce an unpleasant effect, hence a sufficient amount of bicarbonate of soda should always be added to render the solution alkaline.

As a matter of convenience, cocaine may be given in the form of a powder, although it is doubtful if any snuff reaches the parts



with the same degree of thoroughness as a fluid. An excellent formula for this is:

℞ Cocainæ hydrochlorat., . . . . . grs. x.  
Pulv. magnesiæ, . . . . . ʒ ss.

The use of camphor in the past few years has gained a considerable degree of popularity and is unquestionably a valuable adjuvant in the relief of an acute coryza, if used properly. It should be used well diluted, and in a small quantity. Several serious accidents have been reported from its indiscriminate use. The above formula may be used with the addition of grs. iij. of powdered camphor.

The various preparations of mint form both an agreeable and efficacious remedy in catarrhal affections of the nose. The following excellent formula has been suggested by Rabow:\*

℞ Menthol pulv., . . . . . grs. iij.  
Coffæ toastæ,  
Sacchari albæ, . . . . . āā grs. l.  
M. Use as a snuff.

After the vascular plethora has been brought somewhat under control, and the profuse serous exudation has diminished, I find it an excellent practice to make an application of chromic acid directly to the swollen membrane. This is done, not with the idea of destroying tissue, but in the method described fully in the chapter on hypertrophic rhinitis, as affording us one of our most effective remedies for directly controlling an inflammatory process. The membrane having been thoroughly contracted with cocaine, and cleansed by repeated wiping with pledgets of cotton, one or two small crystals of chromic acid are applied to the face of the mucous membrane covering the lower turbinated bone, making a small eschar whose office is to pin down the swollen membrane and prevent a return of blood to the part. This may seem a somewhat irrational mode of procedure, and yet it is one which, if deftly accomplished, will often secure results of a most gratifying character. If this measure fails and we find that, after the cauterization, the membrane swells to its original contour, we will have done more harm than good by our efforts, hence exceeding great care should be exercised that the tissues be thoroughly contracted before the acid is applied, and, furthermore, that the caustic should be so laid on as to burn deeply into the membrane over a limited area, rather than spread broadly over its surface.

Before closing, mention should be made of the great value of dry heat applied externally over the forehead. A nice way of ac-

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\* Deut. Med. Wochenschrift, No. 5, 1886.

complishing this is by means of the small hot-water bags sold in the drug-stores, which can be bound upon the forehead and allowed to remain in situ for several hours at a time. The relief to the frontal headache and the sense of distention or fulness across the root of the nose, is often very striking, while at the same time the inflammatory action is probably modified to an appreciable degree.

The remedy suggested by Woakes<sup>1</sup> for the controlling of neuralgic pain accompanying the disease, may well be resorted to where the usual narcotics either fail of their action, or are not well tolerated. He recommends that gelsemium be given in the form of the tincture, in doses of 10 minims each, to be repeated every three hours until relief is obtained. A more potent remedy and an exceedingly agreeable one is aconitine, which may be given in doses of  $\frac{1}{200}$  of a grain every three hours, care being taken to note the occurrence of the peculiar prickling of the fauces, with numbness of the tongue or extremities, which indicates the limit of toleration of the drug.

If, during the course of the attack, symptoms should appear of threatened involvement of one of the accessory sinuses, resort must be had to measures of a most active character to prevent so serious an accident. These consist mainly in the moderate use of anodynes, and active counter-irritation, with local blood-letting. If the frontal sinus or the antrum of Highmore is in danger, dry cupping immediately over the part should be resorted to, and if this fails of relief, no hesitation should be felt in immediately applying a blister. At the same time it will be found that the application of water to the nasal chambers, as hot as can conveniently be borne, will aid much in arresting this serious complication. This is usually accomplished by the ordinary fountain syringe, additional hot water being added to the reservoir as the flow is established through the nares.

Schech<sup>2</sup> advises the use of leeches to the root of the nose in these cases. This local blood-letting is accomplished without involving the temporary disfigurement which attends the blister or cupping, but I question if it is as efficacious.

If inflammation of the middle ear is threatened, vesicating colodion may be applied in front of the tragus, but a more effectual remedy probably in this case would be in the use of leeches, in addition to this. Politzeration, as recommended by Woakes,<sup>3</sup> may be resorted to, although this measure should be used with the greatest caution. Schech<sup>4</sup> further recommends incision of the membrana tympani, although Buck<sup>5</sup> questions the advisability of this, when

<sup>1</sup> "Post-nasal Catarrh," Amer. ed., Philadelphia, 1884.

<sup>2</sup> "Diseases of the Mouth, Throat and Nose," English ed., Edinburgh, 1886, p. 224.

<sup>3</sup> Loc. cit.

<sup>4</sup> Loc. cit.

<sup>5</sup> "International Cyclop. of Surgery," vol. iv., p. 710.

the morbid process is of a simple catarrhal nature, on the ground that the incision speedily closes and, furthermore, while open it may admit of the entrance of disease-germs. The warm douche, of course, should be freely used in the external ear.

## CHAPTER IX.

### HYPERTROPHIC RHINITIS.

THIS is a chronic inflammation of the mucous membrane lining the nasal cavities, characterized by a permanent dilatation of the blood-vessels, together with increased thickening of the intra-vascular tissues, as a result of which the normal lumen of the nasal passages is so far encroached upon as to interfere with free nasal respiration. In addition to this, and what is of still more serious import, the great respiratory function of the pituitary membrane of serous exosmosis becomes obstructed to a notable degree, whereby the mucous membrane lining the air passages below is subjected to such abnormal conditions as lead ultimately to the development of secondary inflammatory processes in this region.

Probably in no single disorder of the upper air passages is a thorough understanding of its causes, development, and symptoms more important than in the one under consideration, for, as I firmly believe, a morbid process setting in primarily in the nasal mucous membrane is the cause of a large number of secondary affections involving not only the air passages below, but also organs having no especial physiological or regional connection with the nose.

ETIOLOGY.—Perhaps no tissue of the body is more prone to become the seat of a chronic inflammatory process, than the nasal mucous membrane. Why this should be so, it is easy to understand if we thoroughly appreciate the physiological function which it is designed to subserve, as has already been shown in a previous chapter, for through no other mucous membrane of the body, probably, does there pass during the twenty-four hours proportionately as large a supply of blood. Furthermore, this is not in a constant, unvarying stream. On the contrary, the amount of blood, and therefore the calibre of the blood-vessels, changes with every variation in the temperature and humidity of the atmosphere. In this fact, then, I think lies the primary reason why morbid changes are so commonly met with in this region. This, however, will only account for those mild cases of rhinitis which scarcely approach the dignity of a true diseased condition, but constitute merely a source of occasional



temporary annoyance. For the origin of the graver forms of so-called nasal catarrh we must look further.

Taking cold figures in medical literature as a probable cause of most of the acute inflammatory diseases which we meet with in the upper air passages, and chronic inflammation is said to be the result of repeated attacks of acute inflammation. Cohen, Mackenzie, and, in fact, most writers make this assertion. My own belief, however, as already stated, is that the chronic inflammation sets in first, and that repeated attacks of acute inflammation become simply one of the prominent features of the chronic morbid process.

Climatic conditions also are said to exercise an unfavorable influence on the development of catarrhal diseases. This assertion cannot be questioned, but that this is an important factor in the production or causation of nasal catarrh I think is open to question. A given case of catarrhal disease which is a source of exceeding great annoyance in the winter, becomes a trivial affection in the warm, dry atmosphere of the summer months, but a change from the damp climate of our seaboard to the pine forests of southern Georgia effects the same thing. It is not fair, however, to say that the winter weather or the seaboard in the one case, has been the cause of the disease, any more than it is to say that the return of the summer or a visit to the pine woods on the other hand has cured it, for a change to a favoring climate or region gives simply a temporary relief. The disease returns as soon as the climatic conditions reappear. The essential cause of the disease exists still, and has existed all the time.

I think we are safe in saying, then, that the climatic influences on a catarrhal process are temporary only, whether in affording relief to the symptoms or in causing an aggravation of the trouble. I have no disposition to underestimate the value of a change of climate or the benefit often obtained by the temporary relief which it gives. In the graver forms of disease, we are often compelled to order a change of climate for our patients as affording the only hope of relief. But I think we are never justified in giving hope that a change of climate is going to afford anything but temporary relief in ordinary catarrhal disease of the upper air passages. In those cases, however, in which the disease has given rise to a severe laryngitis or a bronchitis, a change of residence to a more favorable climate often becomes imperative.

Catarrh is often designated as an American disease, and without stopping to question the truth of this assertion, search has been made for some peculiar quality of our climate which has given rise to the universal affliction. I think it is very doubtful if the American people suffer more generally from catarrhal disorders than

those living in the same latitudes on the other side of the ocean. Certainly the general assertion is a somewhat loose one, based on no careful observation. I believe the origin of this mistaken view to be largely due to the fact that diseases of the nasal cavities engaged the earlier and more industrious attention of specialists in this country than in Europe, so that a survey of our literature would naturally lead to the conclusion that nasal disease was exceedingly common here. We find Mackenzie<sup>1</sup> making the assertion that, until the year 1880, it had not been his custom to examine the interior of the nose except in patients who referred their symptoms directly to the nasal passages, whereas we recognize the fact that in the majority of our cases of nasal disease the patient refers the symptoms to the fauces or other parts, and oftentimes denies the existence of nasal trouble.

The assertion is also made, in searching for a cause of American catarrh, that it is due to our dry and dust-laden atmosphere. I do not think American people, as a rule, are greatly subjected to the deleterious influence of a dry and dust-laden atmosphere, nor, furthermore, that those who are thus exposed, suffer as a result necessarily from catarrhal disease. Lenox Browne<sup>2</sup> ventures the assertion that "mechanical irritation, as from particles of snuff, the pollen of grass and of flowers, fine dust, etc., is almost as important a factor in the production of nasal erection as changes in the temperature of the atmosphere, and if long continued will certainly lead to a permanently enlarged, swollen, and hypertrophied condition of the erectile tissue and mucous membrane generally." Mackenzie<sup>3</sup> also states that chronic catarrh may be caused by the inhalation of irritating vapors or solid particles suspended in the atmosphere. Turning now to one of the most accomplished of our American writers on this disease, we find Beverley Robinson stating: that "trades in which irritating vapors or dust are breathed more or less constantly are an efficient cause of chronic coryza. Such are, in my experience, those of carpenters, tobacconists, workers in carpet factories, woollen factories, machine shops, chemical works, etc."

One naturally hesitates to take issue with such careful observers as those referred to, and yet my own experience teaches me that, whereas a dust-laden atmosphere may be the source of discomfort and irritation to the nasal passages, yet as an efficient factor in the

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<sup>1</sup> "Hay Fever," London, 1885, p. 28.

<sup>2</sup> "The Throat and its Diseases," London, 1888, p. 501.

<sup>3</sup> "Diseases of the Throat and Nose," American Edition, Philadelphia, 1884, vol. 2, p. 313.

<sup>4</sup> "Nasal Catarrh and Allied Diseases," New York, 1885, p. 65.

production of organic changes in the deep tissues of the membrane, I believe it to be greatly overestimated. I do not think that workers in tobacco or carpet factories, or mines, suffer as a rule from nasal disease. The old discussion in regard to "miner's lung," it seems to me, sustains this point, for it is a well-known fact that workers in coal mines inhale the dust of coal to such an extent that the lung tissue itself even is oftentimes stained with the carbon, yet this occurs without involving these delicate structures in serious danger. When we consider the far greater vulnerability of these tissues than the tissues affected when the dust enters the nasal cavities, the fact referred to would seem to go far toward establishing the view that a dust-laden atmosphere is comparatively harmless to the mucous lining of the upper air tract.

As regards the influence of tobacco on catarrhal diseases, I can only repeat here what I stated in a former work,<sup>1</sup> when, in discussing the use of tobacco as a habit, I wrote as follows: "The progress of the chronic pharyngitis is marked, of course, by repeated acute attacks of ordinary sore throat. As the disease develops under the stimulus of these repeated attacks of acute pharyngitis, or developing from the commencement as a chronic affection, as it occasionally does, it comes under the influence of certain secondary predisposing and aggravating influences whose effect is to greatly increase the morbid condition. The use of tobacco is a habit which it is the fashion to charge with having a large influence in the production and aggravation of chronic pharyngitis. Smoking and chewing are, undoubtedly, pernicious and uncleanly practices, but that they are responsible to the extent usually laid to their charge in influencing a throat catarrh is probably not true. Tobacco smoke is without question an irritant to the mucous membrane of the air-passages, especially if inhaled in a concentrated form. On the other hand, it is also true that the mucous linings easily become inured to the action of the smoke, so that breathing or inhaling an atmosphere charged moderately with it, is tolerated with immunity. Cubans are, perhaps, among our most inveterate smokers, and that in its worst form in the use of cigarettes, and yet they suffer somewhat rarely from throat catarrhs.

"I do not wish to say that the use of tobacco may not, or does not exercise an injurious influence on the throat, for it undoubtedly does in many cases, but that this is the result of the direct contact of the smoke with the membrane I regard as very improbable. The effect of smoking in producing gastric disturbance, as shown in the various forms of dyspepsia with which excessive smokers suffer, and this, in turn, leading to the aggravation of an existing pharyngeal

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<sup>1</sup> "Diseases of the Throat and Nose," N. Y., 1881, p. 82.



catarrh, would seem to me to present the true explanation of the injurious action of the habit on the throat. And, again, the absorption of nicotine which necessarily takes place, as evinced by the headache, palpitation of the heart, and muscular tremor which results from the excessive use of tobacco, produces a systemic condition, which cannot but react unfavorably on the morbid process in the fauces. From what has been said it will be easily understood that, while condemning the use of tobacco as a vicious and uncleanly habit, and asserting that its excessive use may exercise a very injurious influence on the throat, the idea is only intended to be conveyed that the pernicious influence is an indirect one, and not due to the contact of the smoke with the mucous lining of the upper air-passages. Hence, in estimating the influence of the habit on an existing throat-catarrh, the judgment must be based mainly on the evidence of the injurious action of the nicotine absorption, as shown by gastric disturbance or cardiac symptoms.

"In addition, it may be said that the fumes of tobacco come in contact, to a very moderate extent, with the mucous membrane beyond the palate, and the only smoke which reaches the parts farther down is that which impregnates the atmosphere which the smoker breathes in common with others near him, or in the same room. Hence, of two persons, one smoking, and the other not accustomed to the habit, it is probable that the smoker escapes with the greater impunity from the direct effect of the vitiated atmosphere. I am disposed to regard the habit of chewing as even more vicious than smoking in its effect on the throat, and yet, as a rule, the tobacco chewer does not allow the saliva to reach beyond the mouth, hence it cannot be that its bad effects are the result of direct contact, but are rather due to the indirect effect of the nicotine absorption which must necessarily result from the habit."

The question of diathetic conditions, as influencing catarrhal disorders, figures largely in our older literature, many writers even asserting that there exists a true catarrhal diathesis. This condition, I think, lingers mainly in the minds of the laity, and we frequently hear statements made on the part of patients that all their mucous membranes are weak. That there is any special connection between the different mucous membranes of the body not physiologically connected, or anatomically continuous, I think is incorrect. My own observation leads me to the conclusion that catarrhal diseases of any mucous membrane are largely local in character, and that any constitutional disturbance which accompanies them is secondary in character. Certainly I have never met with any case which seemed to me to present evidence of a catarrhal diathesis.



How far the rheumatic or gouty habit may influence catarrhal processes is an exceedingly nice question to decide. Rheumatic or gouty pharyngitis is undoubtedly met with not infrequently, but the pharynx, as I believe, has no physiological connection with the breathing apparatus. Catarrhal inflammation of the nose due to the gouty or rheumatic diathesis I have not met with.

The graver dyscrasiæ, such as have been called the tubercular and scrofulous diatheses, undoubtedly exert a certain amount of predisposing influence in the production of catarrhal diseases, if we use this term in the sense of an unhealthy or excessive discharge from the nasal passages. It is doubtful, however, if they ever lead to the production of connective-tissue hyperplasia, the prominent condition which obtains in the disease under consideration. Their influence is, then, to aggravate the symptoms of an existing catarrhal inflammation, and perhaps hasten the hypertrophic process, rather than to exercise any clearly recognizable causative influence in the development of the inflammatory action.

By far the most frequent cause of hypertrophic rhinitis, I believe, lies in a deformity of the nasal septum, giving rise to nasal stenosis, which generally occurs in the anterior portion of the passage. Its method of development is, to a certain extent, mechanical, and may be explained as follows: During infancy or childhood, as we know, the cartilages and bones of the nose are soft, somewhat pliable, and, furthermore, especially subject to injury. The child learning to creep perhaps, or learning to walk, has a fall and strikes naturally the most prominent feature of the face; or again, in childhood or youth, in the rude and boisterous amusements which children indulge in, a blow on the nose is, one of the most frequent of accidents. The effect of this is that, while in many cases it gives rise to noticeable symptoms, as when a true fracture occurs, in a far larger number of cases, the injury gives rise to mere temporary discomfort, the symptoms pass away, and the accident probably is forgotten. Now, in the case of fracture with resulting deflection of the septum, the symptoms may set in and develop with a considerable degree of rapidity, whereas in other cases, where the blow has been less severe, a mild deformity takes place, a low grade of inflammation, possibly at one of the sutures of the septum, an arthritis perhaps, resulting from a separating of the two plates which form the septum, producing a bony or cartilaginous projection into the one or other nostril which may reach its full extent at the time of the injury, or may gradually develop as the result of a low grade of inflammatory action, and become more extensive in character as time lapses. In every case, however, the effect is a stenosis of the nasal cavity. If now we study the effect of the simple mechanical

obstruction to the entrance of air to the nasal passages during the act of inspiration, we shall find, I think, that it throws much light upon this question of the causation and development of catarrhal diseases in these cavities. Now with each act of inspiration, that portion of the mucous membrane which lies immediately behind the point of obstruction becomes subjected to diminished atmospheric pressure. This diminished pressure acting on the soft, spongy, vascular tissues covering the turbinated bones, results in a tendency to abnormal turgescence. This action is probably very slight in the first few years after the injury has been received. But as time goes on, there is gradually developed a permanent hyperæmia or distention of the blood-vessels. Furthermore, it may be noticed that if the obstruction be but partial, this turgescence is developed in the narrower passage. If, on the other hand, the injury is such as to completely occlude one passage, all of the inspired air is compelled to pass through the opposite side, and we have the hyperæmia and hypertrophy developing in the open side. In fact, it is necessary for the development of this chronic congestion that a current of air should pass through the side affected, as we often see the membrane in that passage which is completely stenosed, as the result of a deflected septum, absolutely bloodless. Not only does it not become the seat of hypertrophic changes, but there is a certain amount of shrinking as it were, in the tissues, not the atrophy which we meet with in atrophic rhinitis, but a bloodless condition of the vessels due to abolition of function. The result of hyperæmia, of course, is to increase nutrition, and we have finally set up certain structural changes in the membrane proper. The superficial blood-vessels and the large venous sinuses of the membrane, more especially the latter, become excessively dilated, the vascular walls lose tonicity, vascular control is impaired, while at the same time, as a result of this hyper-nutrition, the intra-venous tissues become notably thickened, and we have, as a consequence, true hypertrophy taking place, a permanent structural thickening of the membrane.

The point which I endeavor to make here of traumatism as the original cause of so large a proportion of these cases of hypertrophic rhinitis is, I think, an exceedingly important one, and I repeat again that an essential point of this theory is the fact that the injury itself antedates the morbid symptoms, oftentimes many years, and that the development is essentially an exceedingly slow process. This must necessarily be true, for I think when we examine the mucous membrane histologically we cannot but be convinced that the condition is one which has only resulted after long years of development. The natural history of the connective-tissue cell from its first development until it eventually becomes

an elemental part of the tissue, as a well-developed connective tissue cell, is a process of years.

Deformities and deflections of the septum are by no means the only cause of nasal stenosis. Any deformity which causes narrowing of the nostril, will produce the same train of symptoms. A displacement of the triangular cartilage of the septum I have seen act in the same manner. Weakness of the dilator muscles of the nostril also, although rarely, is a very efficient factor in the production of hypertrophic rhinitis. Deformity of the alar cartilages, by which the normal aperture of the nostril is narrowed, we occasionally meet with acting in the same manner. Not infrequently we meet with cases in which hypertrophy has taken place without any mechanical stenosis. These cases may be attributed to taking cold, for this we must recognize as one of the causes of catarrhal disease; for, while undoubtedly the habit of taking cold, as before stated, is due primarily in these cases to the chronic inflammation, and that, as before stated, in the majority of instances is due to deflected septum, we must acknowledge that repeated attacks of acute inflammation may precede the chronic process.

If we search further for the causes of these cases, I think we find them largely in errors of clothing, vicious habits of life, undue exposure, neglect of the skin, and that long train of bad habits which we include under the general designation of improper hygienic surroundings. Any one who dresses improperly, who wears excessively heavy clothing, or, on the other hand, is too thinly clad, who neglects the proper use of the bath, who is badly nourished from improper or insufficient food, who is badly housed, who sleeps in close, illy ventilated rooms, of course is liable to catarrhal troubles unless he possesses some more vulnerable hereditary or acquired habit. In other words, when a man is subject to serious exposure in perfect health, he suffers from a cold in the head far more frequently than anything else unless he has inherited or acquired a rheumatic or gouty habit, or possesses some other special weakness, under the influence of which affections of this nature develop, as the results of exposure, rather than the catarrhal disorder.

**SYMPTOMATOLOGY.**—The prominent symptoms resulting from this condition are due primarily to changes in the normal secretion of mucus. As we have already learned in the chapter on the physiology of the nose, the secretion in health consists of a limited amount of mucus together with a very large amount, a pint or more, of serum, whose source is in the venous sinuses, in the deep layer of the membrane, from which it makes its way probably by exosmosis. Now, the deposit of connective tissue in the inter-vascular tissues, giving rise to notable thickening, necessarily results in



an obstruction to this exosmotic process. The amount of serum which transudes is diminished, while at the same time the blood-vessels, not being unloaded by normal transudation, become distended. The discharge from the nose itself, instead of being a sero-fluid mucus, becomes thick and inspissated. The membrane becomes swollen and thereby encroaches notably on the normal lumen of the nares, thereby obstructing nasal respiration. This sero-mucus, which in health makes its way imperceptibly into the fauces and disappears, now shows a tendency to lodge in the nasal chambers, or, flowing back into the posterior part of the lower meatus, is hawked back by a sort of nasal screatus into the pharynx. Furthermore, as the result of increased nutrition, there is a certain amount of activity in the epithelial elements on the surface of the mucous membrane by which normal proliferation is notably increased, so that we have the character of the secretion from the nose still further changed by the admixture of young epithelial cells, which renders it somewhat thicker in consistency and opaque in character.

There is no tendency whatever to the formation of crusts or inspissated masses, nor do foetid and offensive secretions accompany this form of catarrhal disease. If such symptoms are present, they should always be regarded as evidence that some other form of disease is to be dealt with. It is a popular delusion, fostered by even very intelligent writers and observers, that the secretions in hypertrophic rhinitis are foetid and irritating. Now, the only change that takes place, as I before said, is in the relative amount of normal mucus and serum which affects the consistency of the mucus alone. There are a few epithelial cells added, but these do not affect the character of the discharge to any notable degree. Now, this discharge differs, in its irritating qualities, in no essential degree from the healthy secretion. Probably no secretion of the body is blander and less irritating than that of the nose in health. If there is any element in it which is irritating it is the serum, containing as it does a certain amount of saline matter. In hypertrophic rhinitis this element is diminished, so that we might say, if there is any difference in the secretion in the two conditions, it would be in favor of the secretion from the diseased membrane.

The popular fear in regard to nasal catarrh is that sooner or later it will result in offensive discharges. This is based partly on the teaching of irregular practitioners that catarrh, so-called, leads to ulceration and necrosis. It is scarcely necessary to say that ulceration and necrosis belong in no possible manner to hypertrophic rhinitis, but are only met in connection with syphilis, scrofula, and other grave diseases. This theory of offensive discharges occurring in this disease is based also on the teaching that atrophic



rhinitis is a later stage of hypertrophic. This assertion, I think, was originally made by Fränkel in his admirable article on the nose in the fourth volume of Ziemssen's *Encyclopædia*, and subsequently adopted by most other writers. The assertion is, I believe, based on absolutely incorrect clinical observation, as the two diseases are totally separate and distinct in character from the commencement, as will be shown when we come to the discussion of atrophic rhinitis. The fœtid odor, therefore, is never met with in connection with hypertrophic rhinitis, though we find so careful an observer as Fränkel<sup>1</sup> stating that hypertrophic rhinitis may give rise to an odor, although not the characteristic odor of ozæna. Fränkel's error here is one easily explained, as I have had occasion of observing in a number of instances which have been under my own care, where it was strenuously insisted upon, on the part of patients under treatment for hypertrophic catarrh, that there was an offensive odor. In every case I was enabled to trace the odor to the mouth. The patients sleeping with the mouth open, the tongue became dry and furred, and the thick velvety epithelium on its dorsum was the source of a slightly offensive odor, which persisted for some hours, perhaps, after arising in the morning.

In other cases I have traced the odor to the existence of decayed teeth, amalgam fillings in the teeth, etc. In all cases the mouth is to be inspected in the search for the cause of a fetid breath in hypertrophic rhinitis, as it cannot be found in the nasal passage.

Nasal stenosis with mouth-breathing is always a prominent symptom of the disease, as a necessary result of the mechanical obstruction to the passage of air through the nose. Mouth-breathing is often considered to be a habit, and we even find various devices resorted to to break up this so-called habit. Now, mouth-breathing probably is never a habit. It is a necessity due to the fact that the individual cannot get air enough through the nose, and hence is compelled to open the mouth.

In consequence of the impairment of the normal function of the nose, under which the exudation of serum is interfered with, we soon have certain changes setting in in the air passages beyond. The first to become affected is the vault of the pharynx. Now, as has already been stated, we have in the vault of the pharynx a large mass of glands which in health pour out a certain amount of mucus which, passing down behind the palate, serves as a lubricant to the bolus of food and facilitates its passage into the œsophagus. This mucus is poured out in large quantities, of which the individual is unconscious. Now, in order that this function shall go on uninterruptedly, it is necessary that the nasal passages in front of

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<sup>1</sup> Transactions of the International Medical Congress, 1881, vol. 3, p. 302.

it shall perform their functions in a normal manner. In other words, it is necessary that the air which sweeps over the glandular structures at the vault of the pharynx should be saturated with moisture. As soon as this nasal function is hampered, and nasal respiration is interfered with, air is largely taken through the mouth, while that which passes through the nose fails to take up sufficient moisture in its passage to bring it to the point of saturation; when, therefore, it reaches the pharyngeal vault it takes up moisture from the mucous secretion of this region. The result is, that the normal secretion of mucus in the pharyngeal vault becomes thick and inspissated, and adheres to the parts in a thick tenacious plug, which hangs down behind the velum of the palate, causing excessive annoyance and oftentimes distress to the patient. During waking hours this is not so noticeable on account of the voluntary efforts of the patient in clearing the nose and fauces. During sleep, however, this pharyngeal mucus accumulates in a large mass, the removal of which in the morning becomes a considerable effort to the sufferer.

Furthermore, the pharynx becomes excessively irritable, and the hawking and coughing in the morning is often attended with retching and vomiting. This involvement of the fauces is scarcely noticeable in the earlier stages of hypertrophic rhinitis, but as time goes on, the faucial symptoms become more prominent, and soon the patient is likely to refer most of his symptoms to the pharynx and say he has a bad throat, very frequently entirely overlooking the nasal disorder. His story will often be that in former days he suffered a good deal of annoyance from his nose, but that it has "gone down" to his throat. The explanation of this I take to be that there has been no amelioration of the nasal symptoms, but a marked development of faucial symptoms, and while the nasal disease still persists in as aggravated a form as ever, he gets to a certain extent accustomed to the discomforts of nasal stenosis and overlooks it in the more aggravated discomfort of his throat disease. Throat difficulties are always looked upon with more apprehension by patients than nasal disorders, and, furthermore, they are the source of more discomfort as involving a far more sensitive region.

This faucial accumulation is usually spoken of as naso-pharyngeal, or post-nasal catarrh. In very many cases, however, we can undoubtedly trace its development to a previously existing disease of the nasal passages proper, in the manner above outlined. That it is met with, however, as an independent disease cannot be questioned, but even in such a case there is still an intimate pathological connection between the two regions, under which they natu-

rally react the one upon the other. These questions, however, will be discussed at length in the chapter devoted to the consideration of catarrhal disease of the naso-pharynx.

Catarrhal inflammation of the lower pharynx does not occur in connection with rhinitis, but we not infrequently find the scattered follicles along the surface of the pharynx enlarged and inflamed, together with the chain of glands immediately behind each pillar of the fauces. This follicular enlargement is probably entirely the result of the nasal disorder. It gives rise, however, to no marked symptoms, as a rule, except in nervous, hysterical female patients. As the disease progresses, we find the larynx, trachea, and air passages beyond involved in a mild catarrhal process. This is not due to any extension of disease from the nasal passages, but is due to the same cause which gave rise to the pharyngeal symptoms, and follows very soon upon their appearance. The air reaching the larynx and trachea in an abnormally dry condition, robs the mucous secretion in these organs of its moisture, and renders it thick and inspissated. Its fluidity being destroyed, it adheres closely to the membrane and gives rise to irritation and a subsequently mild inflammation. As this secondary laryngitis and tracheitis sets in, we find a rather curious development of the disease occurring. Heretofore the patient, as the result of exposure, suffered from cold in the head. Now his colds result in a laryngitis or bronchitis which, running a somewhat slow and persistent course, seems to travel upward. A cold in the head sets in oftentimes days after a bronchitis or a winter cold. This is not the rule, but is of very frequent occurrence. Why it should be so, I do not pretend to explain. Certainly it is not due to the fact of any improvement in the nasal condition, for that is progressive as long as it is allowed to go on without treatment.

Elongated uvula not infrequently occurs in connection with chronic rhinitis, and probably is a direct result of the faucial irritation set up in the later stages of the disease. This elongation, however, is confined entirely to the mucous membrane at the tip of the organ, and does not necessarily involve the muscular tissues; the membrane becomes swollen and infiltrated, and hangs down on the base of the tongue, this condition being aggravated undoubtedly by the hawking and clearing of the throat, which is rendered necessary by the faucial accumulation.

Cough also is not infrequently present, and oftentimes constitutes an exceedingly troublesome symptom. This may be present during acute exacerbations only, or it may complicate the chronic affection. This is often referred to as a reflex cough due to intranasal disease. I do not think it necessary to bring in this obscure



explanation of the symptom, where it is so evidently a direct result of the catarrhal process. In most cases, probably, it is due to the nasal stenosis, causing habitual mouth-breathing with a resultant dryness of the larynx and trachea. In other cases it is due to the catarrhal inflammation which sooner or later involves the whole upper air tract, in the one case giving rise to a dry, hacking, irritating cough, unaccompanied by secretion, while in the other case there is a moist cough with more or less profuse expectoration.

Symptoms referable to the ears, I believe to be present in a far larger proportion of cases than is usually recognized by our standard authorities either on throat or on ear diseases. Deafness is perhaps the earliest and most easily recognized symptom with which we meet in this connection, and yet this is a somewhat vague expression. A moderate diminution in the hearing distance as tested by the watch will probably be recognized in a very large proportion of cases of intra-nasal disease, and yet where this diminution is but moderate it is not always safe to say that it constitutes a morbid condition directly due to the nasal disease, especially when we remember that, while the watch-test is perhaps the best we possess for testing the hearing, yet it is an exceedingly unreliable and uncertain one. We should avoid, therefore, attaching too great importance to it.

Disease of the middle ear as recognized by notable impairment of hearing, retraction, atrophy, or calcification of the membrana tympani, together with obstruction of the Eustachian tube as determined by politzerization or the use of the catheter, is by far the most frequent morbid condition of the auditory apparatus met with in connection with intra-nasal disease. This affection is undoubtedly a direct result of the hypertrophic process in the nasal chambers. As regards the method of its development, there would seem to be some difference of opinion. Older writers almost invariably attributed it to the extension of the catarrhal process to the Eustachian tube, causing obstruction. In this manner the renewal of air in the middle-ear chamber was said to be mechanically interfered with. An examination with the rhinoscopic mirror of the Eustachian orifices in a very large number of cases shows, I think, that one of the rarest conditions with which we meet is catarrhal inflammation involving the membrane lining the Eustachian orifice, as evinced by redness, swelling, and hypersecretion. Even in cases in which the middle-ear symptoms are well marked, and in which the morbid process has resulted in an extreme degree of impaired hearing, this examination fails to show any evidence of this extension of inflammation by continuity of tissue. We must, therefore, seek for some other explanation of this complication. As we know, the integrity of



the function of audition is dependent upon equable air pressure on both sides of the membrana tympani. In other words, the air within the middle-ear chamber must be constantly renewed in order that the pressure within the tympanic cavity shall not be diminished. Now, this renewal of air is accomplished during the respiratory process through the nose. If nasal stenosis exists, with each act of inspiration there is diminution of the air pressure behind the point of obstruction. We find, then, a more or less permanent condition of air rarefaction in the vault of the pharynx. This condition necessarily makes itself felt through the Eustachian tube and in the middle-ear chamber. This slight force, acting through a long period of time, results eventually in producing an hyperæmic condition of the mucous membrane lining the Eustachian tube and the middle ear chamber, together with retraction of the drum-membrane. This action we see, then, is purely a mechanical one, but it seems to me, it is one which harmonizes more clearly with clinical observation, and lends also intelligence and clearness to our therapeutic efforts.

It may be stated here, in support of this view, that this form of middle-ear disease, while frequently met with in hypertrophic rhinitis, nasal polypus, deflections of the septum, and in fact any disease which gives rise to stenosis, is far less frequently met with in connection with atrophic rhinitis and ozæna. The above reference is mainly to cases of catarrhal inflammation of the middle ear, but it may be added that, in cases of suppurative otitis, I have seen results so gratifying in character as to warrant the statement that in all cases of this affection treatment of intra-nasal disease, if present, becomes an imperative duty.

In a certain proportion of cases of hypertrophic rhinitis, tinnitus aurium is met with, usually in connection with middle-ear disease, though in a smaller number of cases there is apparently no organic lesion. That this distressing symptom may be dependent on the nasal disease is shown by the fact that, in a flattering proportion of cases, it disappears under treatment, and even in those instances in which complete cure is not accomplished, marked relief is afforded.

Hypertrophic rhinitis is also a prominent factor in the causation of attacks of hay fever and asthma. This, however, will be discussed in the chapters devoted to those affections.

Headaches, eye troubles of various kinds, together with a large number of nervous diseases, such as chorea, epilepsy, etc., occur also in connection with intra-nasal disease. The discussion of this relation is more properly relegated to the chapter on nasal reflexes.

**PATHOLOGY.**—The accompanying cut (Fig. 65) represents a section of a mass removed from the posterior portion of the lower tur-

binated bone. The changes may be described as follows: The whole mucous membrane is markedly thickened and deeply corrugated. The epithelial layer is augmented or increased in width. The outermost layer of epithelium in specimens from the middle turbinated bones exhibit fine ciliae, while in sections from the lower turbinated bones the ciliae are occasionally wanting in places. There are deep valleys running downward into the adenoid layer which are filled with stratified epithelia. The latter consist of elongated epithelia, ten to twelve layers in diameter. The layer nearest the adenoid tissue is occupied by distinctly developed large columnar epithelia, which, especially where they go to fill the valleys, are very large,

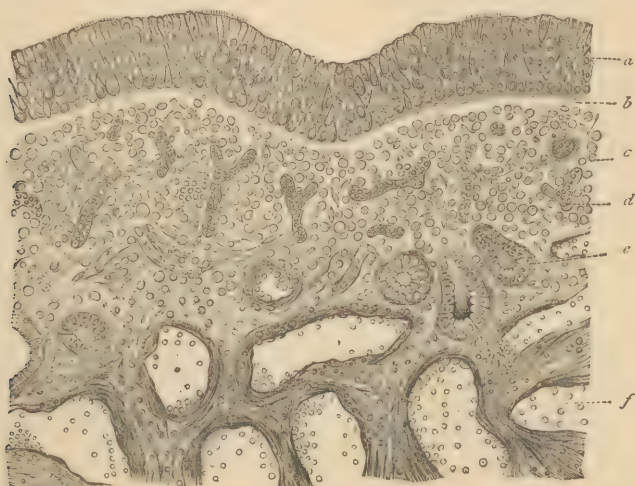


FIG. 65.—Hypertrophic Rhinitis.  $\times 500$ . *a*, Epithelial layer; *b*, limiting structureless membrane; *c*, adenoid layer; *d*, blood-vessels filled with blood; *e*, acinous gland; *f*, venous sinus composing the so-called erectile tissue.

and composed of several strata. The boundary line between the epithelia and the adenoid tissue is everywhere well marked, and in some places there is even present a layer without distinct structure, the so-called structureless membrane.

The *adenoid layer* is very wide, and is composed largely of a myxomatous reticulum, with numerous lymph-corpuses, while in some portions the lymph-corpuses are very scanty, and the whole mucosa is composed of very dense decussating bundles of fibrous connective tissue. The mucosa is in all instances richly supplied with relatively wide capillary blood-vessels, mostly filled with blood. The acinous mucous glands are very numerous, and evidently increased in size and number. They are composed of cuboidal epithelia, which, in many instances, exhibit the features of inflammatory corpuses. The ducts of the glands are traceable into the valleys

on the surface of the membrane, where their columnar epithelia blend with that of the outer epithelial coat.

The *submucous coat*, beneath the adenoid tissue, consists of a broad layer of either myxomatous, or fibrous reticular structure, in which there are present enormously enlarged blood-vessels of a venous character. These veins are so abundant that they resemble a true erectile tissue. The connective tissue, however, between these large veins is broader than is usually found in true cavernous tissue, and is supplied with bundles of smooth muscular fibres. The muscle-coat of the veins is also increased in breadth

The arteries, though scanty, are all of a wavy course, constituting the so-called helicine arteries. The submucous layer also contains a number of racemose mucous glands, increased in size. The presence of these glands in this layer of the membrane is, I believe, anomalous. Around these glands there are found, as a rule, heaps of lymph-corpuscles.

The characteristic features of hypertrophy of the nasal mucous membrane, then, may be briefly summarized as follows:

*First.*—Increase of the covering epithelium, without desquamation.

*Second.*—Increase of the adenoid layer and its capillaries, with stagnation of blood, together with a new formation of fibrous connective tissue replacing the adenoid layer.

*Third.*—Increase of the racemose glands, both in the adenoid and submucous layer.

*Fourth.*—Hypertrophy of the connective tissue between the enlarged veins in the submucous layer

*Fifth.*—In advanced stages of the hypertrophic process, an absence of lymph-corpuscles, they having evidently been transformed into connective tissue.

At the anterior termination of the middle turbinated bone, the hypertrophic process develops in a somewhat different manner, in that, while there is still evidence of inflammatory action, the thickening of the membrane is largely due to a myxomatous transformation, which gives to the tissue a somewhat soft, gelatinous consistency, with a gross appearance closely resembling that of an ordinary nasal polypus. The histological structure of this tissue is well shown in Fig. 66.

DIAGNOSIS.—The question has been raised as to what constitutes a diseased condition of the nasal mucous membrane, and whether we can recognize it in its milder forms by sufficiently characteristic appearances. I think not only that we can do this, but that we should do so in all cases, with the same delicacy of appreciation as is used in the recognition of diseased conditions of other organs, and this



by ocular inspection; for since the introduction of the use of cocaine we are enabled to bring into view the whole of the nasal cavities, in a manner so thorough that no morbid process existing there should escape notice.

An examination anteriorly will show the mucous membrane swollen and of a bright reddish-gray color, with perhaps a pink tinge. This is not the bright scarlet color of acute inflammation, nor again the purplish hue of purely venous congestion, but something between the two, the swollen condition being, as we know, due entirely to the plethoric state of the venous sinuses, although the superficial color is given by the hyperæmia of the capillaries of the mucosa proper. The surface of the membrane is rounded,

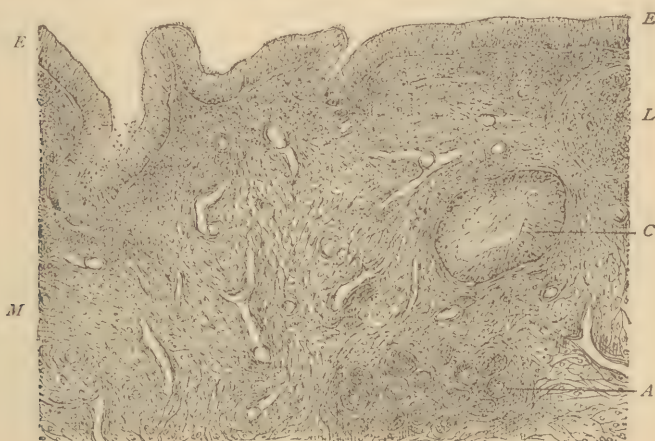


FIG. 66.—Myxomatous Hyperplasia of the Nasal Mucosa from the Anterior Termination of the Middle Turbinate Bone. *E*, Columnar ciliated epithelium; *I*, infiltration of outermost portion with lymph-corpuscles; *M*, myxomatous tissue; *L*, lymph follicle; *C*, crypt of mucosa cut obliquely; *A*, acinous mucous glands.

somewhat irregular in shape, and coated with a limited amount of grayish semi-transparent mucus. If the swelling is but moderate, we may inspect a considerable portion of the membrane covering the lower and middle turbinated bones.

On the lower turbinated, behind its anterior extremity, we find the surface presenting a slightly rugous appearance, while on the middle turbinated we notice a brighter red color, together with a smooth, shining surface, but slightly coated with mucus, and according to the extent of the turgescence, approaching more or less closely toward contact with the septum. If there is considerable swelling of the membrane, we find also the lower turbinated bone approximating itself to the septum, thus rendering an inspection of the cavities beyond impossible.



Examination posteriorly simply brings into view the membrane covering the posterior termination of the middle turbinated bone, together with the posterior half or two-thirds of that of the lower turbinated bone. We find here an appearance differing essentially from that seen in front. The membrane here presents a condition which has been called grubworm hypertrophy, from the fact of its striking resemblance to a large white grubworm, lying one on either side of the septum. On the lower turbinates will be seen a rounded, whitish mass, with a raspberry-like outline of surface, presenting minute furrows and fissures crossing it in irregular lines. This

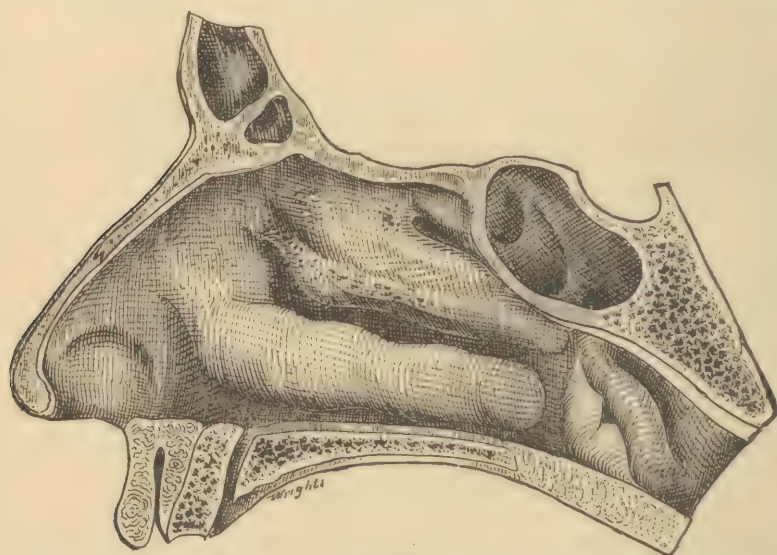


FIG. 67.—The Outer Wall of the Nasal Cavity Showing the Mucous Membrane in a State of Hypertrophy over the Lower Turbinated Bone.

same appearance is seen on the middle turbinates, although the masses are much smaller, and present an elongated, spindle-like contour.

The superior turbinated tissues may occasionally be seen by this examination, but are rarely the seat of any morbid process. These appearances, as seen through the nostrils, cannot be intelligently illustrated, but in Fig. 67 is shown a lateral view of the outer wall of the nasal cavities, in which the mucous membrane is in a state of hypertrophy, and, as a contrast to this, there is shown, in Fig. 68, the same view in which the membrane is in a fairly normal condition.

In Fig. 69, there is shown a transverse section through the nasal cavities still further illustrating a general hypertrophic process as

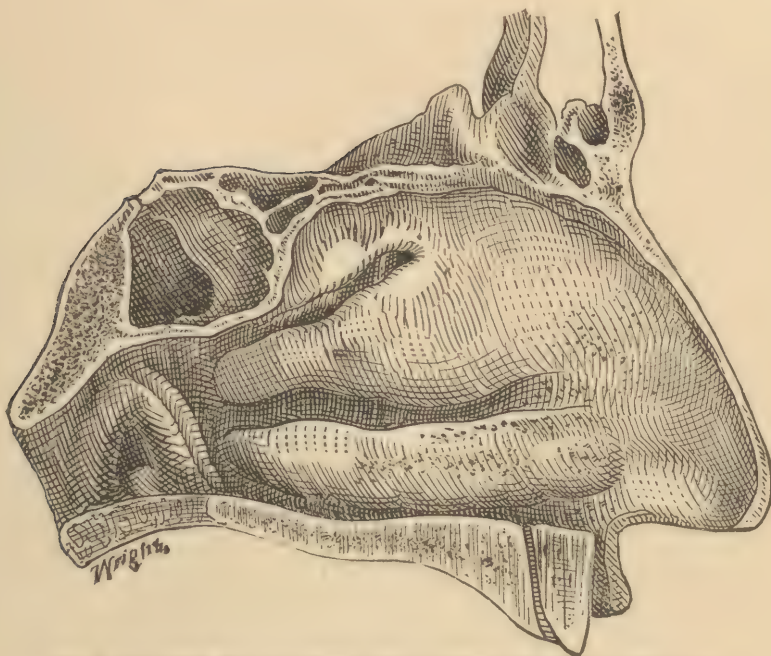


FIG. 68.—The Outer Wall of the Nasal Cavity Lined with Normal Mucous Membrane.

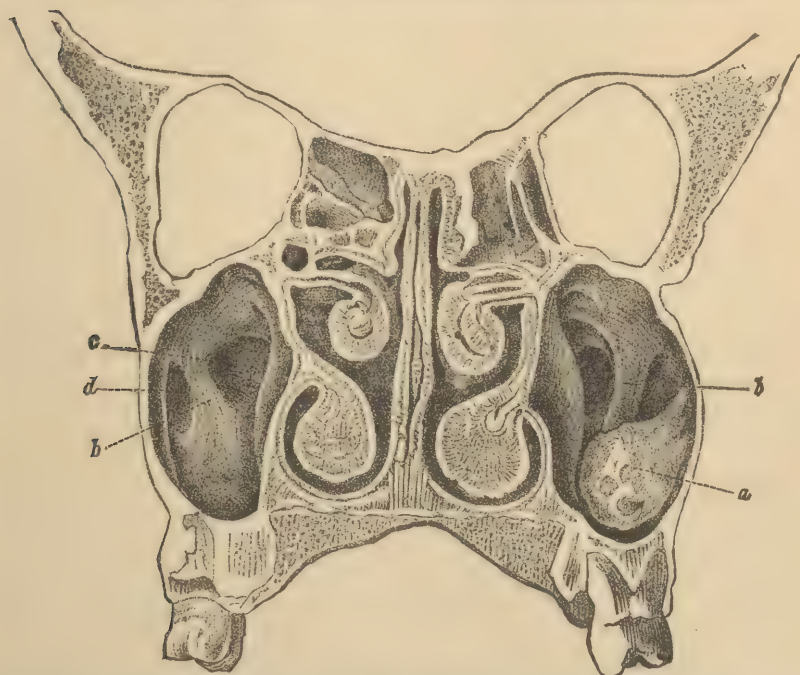


FIG. 69.—Transverse Section through the Nasal Cavities Showing the Mucous Membrane Covering the Lower and Middle Turbinate Bones, in a State of Hypertrophy (Zuckerkindl).

involving the mucous membrane covering both the lower and middle turbinated bones.

A still further development of the hypertrophic process is occasionally recognized by the examination, in which the posterior termination of the lower turbinated bones presents the appearance of large rounded masses with the same rugous surfaces, which more or less completely fill the oval openings of the posterior nares (see Fig. 70)—a condition first described, I believe, by Lefferts and to which the name of posterior hypertrophy has usually been given by writers. Bigelow,<sup>1</sup> in demonstrating the turbinated bodies, called attention to the fact that, if this tissue is artificially distended

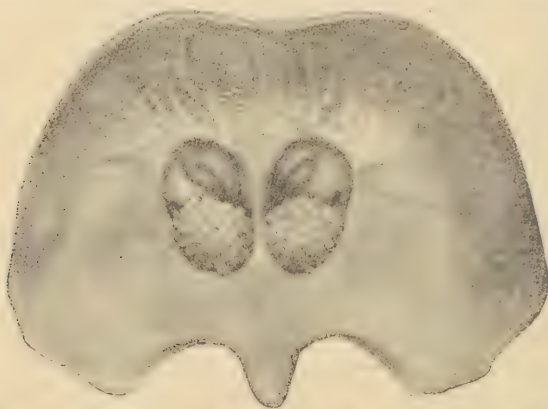


FIG. 70.—Large Masses of Hypertrophied Membrane on the Posterior Termination of the Lower Turbinated Bones, More or Less Completely Filling the Posterior Nares.

by a blowpipe, “a pouch-like process projects from the rear of the bone, increasing its length.”

Bigelow's observation easily explains why these so-called “posterior hypertrophies” occur.

So far our examination has shown us the existence of hyperæmia of the membrane, the amount of which has been recognized by the eye. The amount of true hypertrophy, which exists in the membrane, has not yet been ascertained. There is now to be thrown into the anterior nares, a four-per-cent solution of cocaine by means of the spray apparatus, the effect of which will be to thoroughly expel the blood from the membrane. The action of the cocaine should be carefully watched, and the thoroughness of the application and the completeness of its action be awaited. When the membrane has become thoroughly exsanguinated, we will find the whole of the nasal passages brought completely under observation, unless some condition other than the one under

<sup>1</sup> Boston Med. and Surg. Jour., April 29th, 1875.



consideration exists to interfere with the inspection. We find now the lower turbinated bone covered with a soft, thick, somewhat velvety membrane, which adheres closely to it, and reveals the bony outline more or less completely, according to the extent of the structural thickness of the membrane. Now, if there were no hypertrophy existing in the mucous membrane, the lower turbinated bone would appear almost like a cord lying against the external wall of the nose, covered by a closely adherent, thin, parchment-like membrane, possessing a thickness not sufficient to mask the general contour of the bony structure beneath. If, however, the membrane is the seat of connective-tissue hypertrophy, this will be recognized by the extent to which it does mask the normal bony contour. In front there will be a soft, rounded, cushion-like knob, as it were, grayish-white in color, and which can be moderately indented by the probe, which in all cases should be used freely over its surface, in order to gain accurate knowledge of the extent of the hypertrophic process. Looking along this surface beyond the anterior extremity, we will find the membrane presenting, as a rule, less evidence of thickening, both on inspection and to the impact of the probe, but still sufficient to give a rounded outline to the bone beneath.

If now the head is thrown backward and the middle turbinated tissues are brought into view, they will be seen covering the bone somewhat closely, of the same general tint as the membrane below, but as a rule presenting also a thickened mass anteriorly, which here, instead of hypertrophy, assumes more of a polypoid nature (see Fig. 66). The hypertrophy is of a somewhat myxomatous character, and hence the swelling is not so markedly reduced by the use of cocaine. The probe should be used here also to determine the character and location of the hypertrophic process.

If now we examine posteriorly, the same appearances will present as were seen before the cocaine was applied, with this change, however, that the swollen masses on the posterior terminations of both middle and lower turbinated bones present less prominently, and are smaller in size. Superficially, however, they show the same grubworm-like membrane as before described.

TREATMENT.—The first question which arises in the discussion of the treatment of this affection is as to the value of local applications, such as astringents, alteratives, and stimulants. That these have an effect in temporarily relieving the troublesome symptoms of the disease, I think, no one will question, but when we consider what the morbid lesion is, namely, a deposit of connective tissue in the intervascular tissues, whereby the important functions of the membrane are hampered, I think that all must concede that a simple



local application by means of spray or douche, can have but a very ephemeral effect. Furthermore, their efficiency is quite as great when applied at the hands of the patient himself, as when applied in the office of the physician. There are certain remedies, then, whose action we all recognize, and whose aid we seek by directing that the patients shall make use of them in the intervals of their attendance upon office-treatment. If there is much nasal stenosis with mucus-accumulation in the upper pharynx, a cleansing wash is always grateful to the patient, and he should have it near him for frequent use, simply as a part of his toilet-apparatus. With this we may combine both the cleansing properties of the alkalies with one of the simple astringents, such as:

R	Acidi carbolici,	.	.	.	.	.	grs. iij.
	Sodii bicarb.,	.	.	.	.	.	grs. xij.
	Sodii biborat.,	.	.	.	.	.	grs. xxx.
	Glycerini,	.	.	.	.	.	℥ ss.
	Aquæ,	.	.	.	.	.	ad ℥ vi.

M. ft. lotio.

Or,

R	Sodii benzoat.,	.	.	.	.	.	āā grs. xxx.
	Sodii biborat.,	.	.	.	.	.	grs. ij.
	Thymol.,	.	.	.	.	.	℥ iv.
	Aquæ,	.	.	.	.	.	

Or,

R	Acidi borici,	.	.	.	.	.	3 ss.
	Sodii chloridi,	.	.	.	.	.	grs. xl.
	Sodii tartrat.,	.	.	.	.	.	grs. xv.
	Aquæ camphoræ,	.	.	.	.	.	℥ ij.
	Aquæ,	.	.	.	.	.	ad ℥ vi.

To any of the above there may be added a vegetable or mineral astringent, such as:

Acidi tannici,	.	.	.	.	grs. x. to the ounce.
Zinci sulphatis,	.	.	.	.	grs. ij. to the ounce.
Aluminis,	.	.	.	.	grs. v. to the ounce.
Zinci sulpho-carbolat.,	.	.	.	.	grs. iij. to the ounce.
Zinci chloridi,	.	.	.	.	grs. i. to the ounce.

These are best used by the convenient little atomizer shown in Fig. 47, thus avoiding the inconvenience and possible dangers of the Thudichum nasal douche, which, moreover, is no more advantageous, either as a cleansing device or as a medicating medium, than the atomizer. In the absence of an atomizer, I think the simple device of insufflation of warm salt water from the hand may be safely recommended to the patients, where any comfort results from the cleansing of the passages thereby secured. Snuffs, whether in-

sufflated from the fingers or blown by an insufflating apparatus possess no advantages over aqueous solutions. They simply call upon the mucous membrane for a sufficient amount of water to dissolve their efficient ingredient, before they can exert any influence, unless we except those which are used for stimulating purposes, and here we have a method of local relief to those cases which is oftentimes of undoubted temporary benefit. There are certain remedies which, when applied to the nasal membrane, give rise to pain and irritation, for the time, followed by a more or less profuse watery discharge from the nose. Their first effect is rather distressing; the ultimate effect, exceedingly grateful to the patient. The watery discharge which they excite, seems, as it were, to unload the plethoric veins by this profuse exosmosis, which in its discharge seems to wash out the glands, and carry away a lot of surface debris, by which the membrane is for a time very markedly relieved, and the discomfort of the patient much alleviated. The ultimate effect, however, is of somewhat questionable advantage. Certain of the largely advertized catarrh snuffs sold in the drug-stores act on this principle. The most notable of these remedies are perhaps bicarbonate of soda, bromide of potassium, sanguinaria, galanga, etc. None of these remedies should be applied undiluted to the nasal mucous membrane in a state of hypertrophy, although all of them possess beneficial qualities in the atrophic form of the disease. The only advantage of powders is, that they may be carried in the vest-pocket and used at frequent intervals. The principle of their action is the same as the lotions above given, hence we may prescribe them of the same proportions, substituting a bland, neutral powder for the water, as follows:

℞ Argent. nitrat., . . . . . grs. ij.  
 Zinci chloridi, . . . . . grs. iv.  
 Bismuthi subnit., . . . . . 3 ij.  
 Sacchari lactis, . . . . . 3 vi.

M.

℞ Acidi tannici, . . . . . grs. x.  
 Pulv. acaciæ, . . . . . ̄ i.

M.

℞ Hydrarg. chloridi mitis, . . . . . grs. xx.  
 Bismuthi subnitratis, . . . . . 3 i.  
 Magnesiæ calc., . . . . . ̄ ss.

M.

℞ Iodol, . . . . . grs. xx.  
 Pulv. camph., . . . . . 3 ss.  
 Pulv. acaciæ, . . . . . 3 iv.

M.

If the stenosis in these cases is troublesome, I see no objection to placing in the hands of the patient a two-per-cent solution of cocaine, with a small atomizer, by the occasional use of which he may give himself the temporary relief that this drug affords.

All of these remedies, it should be understood, are merely palliative; the permanent cure of these cases depends upon measures which will diminish hyperæmia, remove structural hypertrophy, and restore the normal calibre of the passages, while at the same time the healthy respiratory function of the membrane is re-established. Wagner<sup>1</sup> advocates the use of flexible metallic bougies which are introduced daily into one or both passages, and allowed to remain in situ for several minutes at a time. Wagner claims that absorption of redundant tissue is thereby promoted. On general principles, in order to produce absorption, equable pressure must be continuously maintained for a long period of time. Certainly in this case, the pressure is neither equably distributed over the hypertrophied membrane, nor maintained sufficiently long to produce any permanent results. The injection of ergot into the hypertrophied tissue by means of a hypodermic syringe, as suggested by DeBlois,<sup>2</sup> we can easily understand, might have an effect on engorged blood-vessels; but we should scarcely expect it to produce absorption of connective tissue. The removal of redundant membrane can undoubtedly be produced by the method suggested by Henderson,<sup>3</sup> who advises that a few drops of pure carbolic acid should be injected into the tissues in several localities along the face of the turbinated bone, thereby securing more or less extensive destruction of tissue by the slough which must naturally ensue. But, the object of treatment, it must be remembered, is not destruction of tissue, but its restoration to a healthy condition. Extensive sloughing, followed by cicatrization, might result in a condition quite as deleterious, or even more so, than the disease which it was originally designed to remove. The last stage of atrophy is really a stage of cicatrization. If this plan of treatment were carried too far, we might easily produce a condition closely resembling an atrophic rhinitis in its advanced stages. The same objection lies with equal force against the various devices which were greatly in vogue some years since, for wrenching away this hypertrophied membrane by means of forceps, such as those of Robinson,<sup>4</sup> which consist of long, tapering blades with teeth in their whole length, which, seizing the membrane laterally, enable the operator to tear it away. In the

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<sup>1</sup> "Diseases of the Nose," pp. 70, 71.

<sup>2</sup> Arch. of Laryngology, vol. iv., p. 20.

<sup>3</sup> St. Louis Med. and Surg. Jour., Jan., 1886, p. 28.

<sup>4</sup> Op. cit., p. 115.

same category should be mentioned the canula scissors of A. H. Smith as described by Robinson,<sup>1</sup> and Woakes's<sup>2</sup> nasal plough. It should be stated, however, that these devices have deservedly fallen into general disuse. Local astringents having failed to accomplish any notably good results in these cases, these harsh measures, above alluded to, were taken up, and advocated for a while with considerable earnestness, but the results of treatment proving even disastrous in many cases, search was made for still other medicaments for controlling the disease and, naturally, the use of caustics was then taken up, and with the idea, I think still, that the destruction of tissue was the end to be accomplished, for we early find recommended the most powerful chemical agents, such as Leyden paste, Vienna paste, and nitric acid, together with the galvano-cautery. Some years since, in discussing this question,<sup>3</sup> I entered my protest against these measures, claiming that better results would be secured by milder treatment, where the object was merely to reduce hypertrophic conditions, and then advocated the use of glacial acetic acid. Since that time, I have abandoned the use of this agent for one possessing more valuable properties as a caustic, namely, chromic acid, on the ground that these powerful agents were apt to do harm rather than good, on account of the difficulties in limiting their application. The question suggests itself in this connection, On what theory or conception of the disease has the use of these powerful caustics been based?

In order to understand the application of caustics to the hypertrophied nasal mucous membrane, we must first form a clear idea of the pathological conditions which we wish to overcome. An hypertrophic rhinitis is the result of certain changes in the mucous lining of the nose. These changes do not affect the epithelial layer at all; the submucosa suffers, if at all, only a slight dilatation of its blood-vessels. It is in the third, or deeper, or cavernous layer, that the important changes take place. Here we have a dilatation of the venous sinuses, increased blood supply, hypernutrition, and a consequent increase of all the elements of the intervenous connective tissue.

Again, this hypertrophy does not lead to increased secretion, as is so often supposed. It is the function of the venous sinuses to pour into the nasal cavities about sixteen ounces of clear serum daily, for the purpose of moistening the air before it enters the lungs. This clear serum, mixed with the normal mucus secreted by the lining membrane of the nose, forms a bland and non-irritating

<sup>1</sup> Op. cit., p. 114.

<sup>2</sup> Op. cit., p. 201.

<sup>3</sup> "Some of the Unsettled Questions concerning Nasal Catarrh." New York Med. Record, November 6th, 1880.



fluid, whose presence we are not cognizant of in a state of health. Diminish the diluting serum, by thickening the walls of the vessels, and the secretion becomes thick and gives annoyance.

From what has already been said, it is evident that the object of treatment should not be to destroy tissue, but to constrict the blood-vessels, diminish the nutrition, and thus counteract hypertrophy. We have found that the deep cavernous layer, by furnishing an increased blood supply, is the primary seat of the trouble. No destructive agent, applied as we are in the habit of using them in treating the nasal mucous membrane, can cause necrosis of more than the superficial epithelium, and possibly, to a very slight degree, of the submucosa; it does not affect the deep or cavernous layer, which is the one chiefly concerned. To what, then, is the beneficial action of a caustic application due, for it certainly is of great benefit.

Until quite recently our caustic applications were effective simply by the contraction of the superficial slough formed. By this contraction the calibre of the venous sinuses was diminished, and the walls of the vessels enabled to regain their proper tone. Since the discovery of the wonderful power which cocaine has of contracting blood-vessels, our caustic applications have been much more efficient. The ordinary procedure is, by an application of cocaine, to deplete the vessels by diminishing their calibre; then by applying our caustic to the most prominent points, to pin down this already contracted tissue by the formation of a superficial slough, maintain the vessels in a state of contraction until they can regain their normal tonicity, and thus control nutrition.

What agent shall we use to accomplish this purpose? Shall we resort to the various chemical agents, or to the potential cautery? The effect is the same in either case. For a considerable time I have used chromic acid to the exclusion of all other agents. Its advantages are well expressed by Dr. Squibb,<sup>1</sup> as follows:

"It is, perhaps, the most important and most valuable of all the erosive caustics, for one simple and characteristic reason, namely, that it is self-limiting in its action, to a degree that no other destructive caustic is. It is an active oxidizing agent, and destroys the tissues to which it is applied by oxidation. Thus far, its action is similar to other caustics, such as nitric acid, for example. But every molecule of chromic acid which destroys a molecule of organic tissue, is itself destroyed, and rendered inert by being reduced to an insoluble and inert oxide of chromium, and this principle and degree of self-limitation is not obtained from any other caustic. Sulphuric acid is also a destructive caustic, but not in the same way

<sup>1</sup>The Ephemeris, July, 1883.

or by the same reaction as chromic acid, and it is not self-limiting. Both sulphuric acid itself, and the products of decomposition by it, are more continuously and injuriously irritant. It is, therefore, a more painful caustic than chromic acid, produces deeper, more prolonged, and more irritable sloughing."

We have, then, in chromic acid an agent which fulfils all the indications. The extreme nicety with which it can be applied, without cumbersome or expensive apparatus, its efficiency, and the absence of unpleasant effects following its intelligent use, have been sufficient to commend it to me, to the almost total exclusion of other agents. It has been claimed that cicatrices result from its use, but I have never observed them. It seems almost paradoxical to control a morbid process by a destructive agent, but at the present stage of our therapeutic resources we possess no better method.

The special manner in which it should be used is as follows: A small, slender probe, such as is shown in Fig. 71, is first dipped in a little mucilage, and then four or five of the slender acicular



FIG. 71.—The Author's Chromic Acid Applicator.

crystals of the acid are taken up upon it, and held over a flame until they are fused into a small tear, as it were, on the end of the probe, which on cooling will present a small, solid red bead of amorphous chromic acid, which can be easily manipulated and carried to the part, already anæsthetized and exsanguinated by the application of cocaine, which it is desired to medicate, without danger of injuring healthy tissue.

The galvano-cautery, since its use was first advocated by Middeldorpf,<sup>1</sup> has come into very extensive use, and is warmly advocated by Mackenzie, Moldenhauer, Sajous, Lennox Browne, Seiler, Schech, Robinson, Moure and others. All of these writers give it preference over other methods, and many of them have presented us with ingenious forms of batteries which are claimed to possess certain advantages.

A smaller number of authorities, while recommending it, fail to give it the first place as a caustic agent, such as Woakes, Cohen, Wagner and others. I think I do not overstate the case, when I say that the potential cautery possesses no advantages over the chemical cautery if properly and deftly applied, and with a nice appreciation of what is to be accomplished. The galvano-cautery

<sup>1</sup> "Die Galvano-kaustik," Breslau, 1854.

battery is a large, unwieldy, cumbrous apparatus, exceedingly liable to get out of order, and a constant source of annoyance by its liability to fail us just when it is most needed, from short circuiting, polarization, or more likely still some hidden and undiscoverable fault which hampers its working. In treating hypertrophic rhinitis, this somewhat complicated apparatus is used to develop a certain amount of heat in a small platinum electrode, for the purpose of

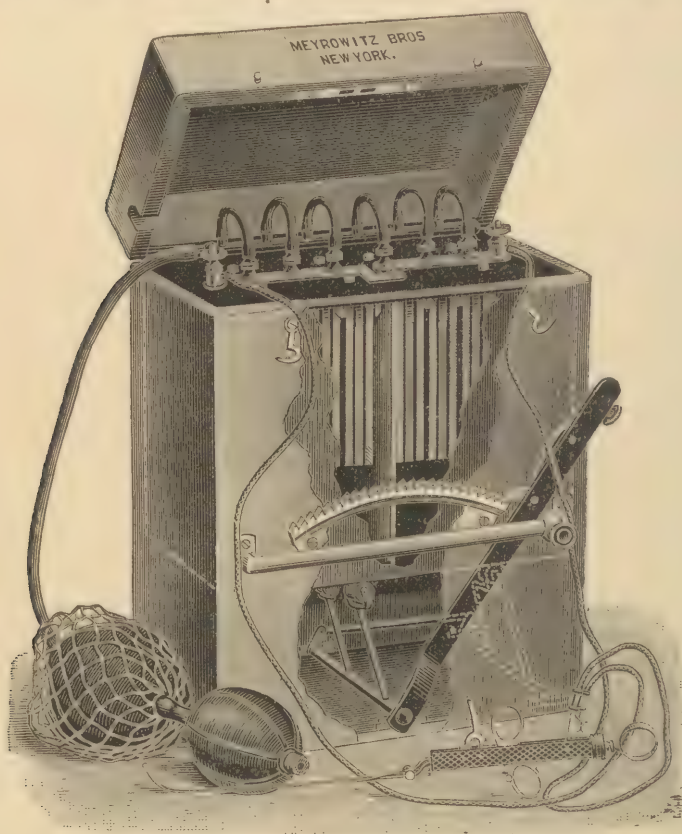


FIG. 72.—Meyrowitz's Portable Galvano-Cautery Battery.

endowing the electrode with a moderate amount of destructive potency. Now, as we have already shown, the amount of absolute destruction which we wish to accomplish is very limited. It would seem, therefore, that we resort to a somewhat irrational process for accomplishing all this, when a few crystals of chromic acid, fused on the end of a probe, will accomplish the same purpose equally well. In condemning the use of the galvano-cautery methods, I do not attempt to criticise the results thereby obtained. There can



be no question as to the success of the so-called galvano-caustic treatment. I merely say that we put ourselves to a vast deal of unnecessary trouble and inconvenience when we use this instrument. I think, however, another point worthy of consideration is that, in introducing the cautery electrode into the nose, and developing in it a high degree of heat, we do incur a certain amount of risk. The chemical cautery, I think, involves no danger. A platinum electrode introduced well into the nasal cavity, and heated to a white heat, or even a dull red heat, in contact with the lower and middle turbinated bones, does certainly add to the danger of the application. Most writers recognize this, and make special allusion to the violent reaction that may set in following its use, giving rise to an acute rhinitis, a distressing neuralgia, an acute dermatitis, or even an attack of facial erysipelas, as I have seen in three cases—complications which rarely, if ever, attend the proper manipulation of a chemical agent. Notwithstanding what has been said, the galvano-cautery is an exceedingly attractive method of treating affections of the nasal cavities, and undoubtedly will always remain a popular instrument, for, when

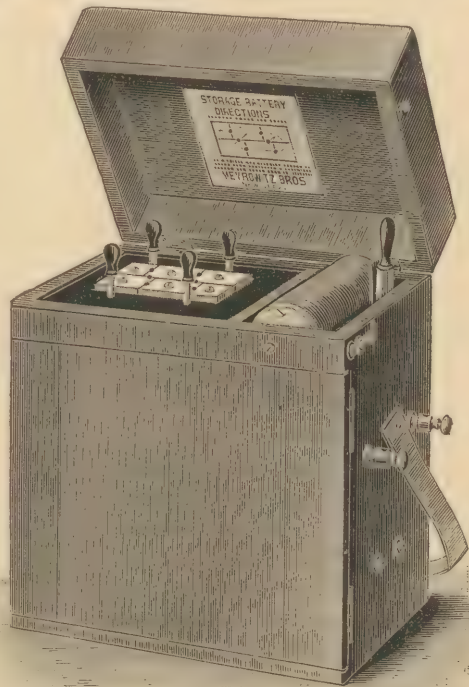


FIG. 73.—Meyrowitz's Storage Battery.

in working order, the manipulation of the instrument is a pleasure to the operator, and undoubtedly produces no slight moral effect on the patient. I have had personal experience with a number of different forms of cautery-batteries, and find it difficult to designate any particular apparatus as offering special advantages. Of the two forms of galvano-cautery batteries, viz., the chemical and the storage, I think the preference usually will be given to the former, in that the charging of the storage battery either requires a somewhat elaborate apparatus in one's office, or the inconvenience of sending it to the electrician for restorage. Of the dip-plate batteries, perhaps none is better than the inexpensive instrument manufactured by Meyrowitz, Fig. 72,



for although somewhat bulky in size, it is simple, and not especially liable to get out of order. In Fig. 73 is shown a simple storage battery which has served the writer well in the somewhat limited use of this method to which he resorts. The cautery handle should be light and easy of manipulation. In Fig. 74 is shown perhaps



FIG. 74.—Galvano Cautery Handle with Flat Electrode for Use upon the Turbinated Tissues.

as efficient an instrument as any other. It is mounted with a flat electrode, suitable for use upon the turbinated tissues. Other forms of electrodes, designed to fulfil special indications, will be selected according to each operator's preference. Various forms of these are shown in Fig. 75. The electrode should be bent at an angle of forty-five degrees with the handle, thus enabling the operator to follow the platinum tip closely with his eye, in order that the cauterization shall always be accomplished directly at the summit

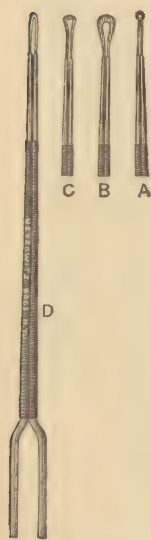


FIG. 75.—Nasal Electrodes. A, Bulb pointed; B, knife; C, curette; D, point.

of any projecting mass of hypertrophied tissue. The platinum tip used should, as a rule, be quite small, and in making the application a limited surface only should be burned over at each sitting. Furthermore, it is well to keep up a slight motion, if possible, in the instrument after the current is turned on, which should always be done after it is carried to the desired locality, and shut off before it is withdrawn, in order that the electrode may cool, and thus healthy tissue in other parts of the nostril escape injury by the instrument on its removal. The object of the slight motion recommended, is to prevent the electrode from adhering to the burned tissues, for when this occurs its withdrawal is usually attended with a tearing away, by which the blood-vessels are ruptured, and hemorrhage ensues. The degree of heat in the instrument, where feasible, should be regulated. This is not possible, however, in all cases. A red heat is preferable, as there is danger of the extreme white heat burning more extensively than may be desired.

It is often recommended to use a cautery-knife, by which the surface of the membrane may be incised as it were, thus burning a furrow well into the turbinated tissues. I think, however, as a rule, a superficial burning, producing a slough such as has been described in connection with chromic acid, will be all that is sufficient, using for this purpose a small flat electrode. A

twenty-per-cent solution of cocaine, of course, should be used in the manner already described in connection with chromic acid. After the burning, the cavity should be repeatedly washed out with a cleansing spray, thus cooling the membrane and allaying such irritation as may be caused by the application.

As a rule, caustic applications are not specially painful and yet, in many cases, notwithstanding the use of cocaine, a certain amount of pain referable to the burned surface will be produced, while in others severe neuralgia will be caused as the result of the caustic acting on the terminal filaments of the nerves. Where this occurs, it is well to allay it immediately, otherwise it may persist many hours. For this purpose nothing is better than the application of dry heat, which is usually accomplished by holding a towel against the hood of the rhinoscope or the chimney of a coal-oil-lamp for a few seconds, and applying it to the face, changing the towel frequently. This is simple and perhaps more convenient than the hot water bag or the Japanese pocket-stove, either of which may be used. The caustic applications should be repeated at intervals of a week or ten days.

These measures will be fully equal to the reduction of chronic hyperæmia with hypertrophy of the nasal mucous membrane, where no complications exist. As has already been stated, probably the most frequent cause of hypertrophic rhinitis is a deflected septum, and it is scarcely necessary to state that any measure for the reduction of the hypertrophic process will give but temporary relief, while the exciting cause remains. Hence, from the full appreciation of the mechanism of the development of the disease, we easily understand that our first efforts should be directed toward the removal of the obstructing septal deformity. This question, however, is fully discussed in the chapter on that subject.

A condition is not infrequently found in these cases which has already been alluded to, and which consists of an hypertrophy of the posterior extremity of the lower turbinated bone. Cauterization does not reduce these masses, and surgical interference is always necessary.

For the removal of this redundant tissue, we possess no device which is so efficient as the cold wire snare *écraseur* which has come so largely into use of late for the removal of growths, hypertrophic masses, etc., in the nasal passages. It is interesting to note in this connection that, as Mackenzie has observed, one of the earliest forms of the snare was devised by Robertson<sup>1</sup> for the removal of nasal polypi, and that this instrument was subsequently modified by Wilde to adapt it for operating upon aural polypi,

<sup>1</sup> Edinburgh Med. and Surg. Jour., 1805, vol. i., p. 410.

while a still later modification was made by Hilton, who in turn adapted it again for use in the nose, for the extraction of nasal polypi. These instruments were designed to be mounted with annealed wire,<sup>1</sup> for the purpose of encircling the pedicle of the growth, after which it was torn from its attachments. Hence we see that they were all technically snares rather than *écraseurs*.



FIG. 76.—Jarvis' Wire Snare-Ecraseur.

To Dr. Jarvis is undoubtedly due the credit of having introduced the principle of *écrasement*, as applied to nasal growths, or certainly to have demonstrated its great value, when he devised the very ingenious and yet simple device which is known as Jarvis' Snare<sup>2</sup> (shown in Fig. 76). It consists of a slender but stout tube, about the size of a No. 3 sound, English scale, on the proximal end of which is turned a thread for about two and a half inches of its length. On this thread there plays a milled nut which carries before it an outer tube, two and a half inches long which slides over the threaded portion. The end of the outer tube is fitted with two small pins for fastening the wire with which the snare is mounted. The wire to be used in this instrument is the highly tempered steel piano-wire, the No. 5 being perhaps best adapted for all purposes. The working of the instrument is obvious. The two ends of the wire are passed up through the inner tube, and firmly fastened to the projecting pins on the outer tube, leaving a loop projecting from the distal extremity, which is drawn within the canula by turning the nut, and thus carrying the outer tube before it.

One great advantage of this instrument consists in the substitution of the principle of *écrasement* for that of snaring, whereby the growth is separated without injuring healthy tissues, and at the same time the danger of hemorrhage notably diminished. Another, and very important feature of it, consists in the use of the steel piano wire, which furnishes a loop of such strength and resistance, that it can be readily carried into the nasal cavity and fitted about a growth without yielding or bending, thus affording a facility in manipulation, which is in no manner equalled by the soft annealed wire loop.

A somewhat ingenious modification of the Jarvis' snare has been constructed by Sajous, as shown in Fig. 77, which consists of a solid

<sup>1</sup> Robertson makes mention of the use of harpsichord wire, though evidently with the design of snaring the growth, rather than of severing its attachments by *écrasement*.

<sup>2</sup> Trans. Am. Laryngol. Ass'n, 1880, p. 130.



stem playing in an outer tube. The proximal end of the stem is fitted with a thread on which plays a nut, while its distal end is slotted on either side for a short distance, and perforated by a small opening. Into this opening are inserted the two ends of the steel wire, when the stem is drawn within the outer tube, thus bending the wire in such a way as to hold the loop firmly in position. The advantage of this device seems to be in the simplicity of its mounting, and the economy of wire.

In dealing with the above condition of posterior hypertrophy already alluded to, the Jarvis instrument is to be preferred. This is mounted with a loop, which an examination of the mass has shown to be sufficiently large to embrace it, and is then passed through the nares until the end of the loop passes the end of the turbinated bone, and is free in the upper pharynx. The loop having been bent slightly to one side before entering the nares, will, by its own elasticity, slip over the mass, when it can easily be drawn into place and the tumefaction cut through. Of course, there is liable to be a considerable hemorrhage as the result of this procedure, but if the operation be done slowly, a half hour or even an hour being consumed, it may often be done without loss of blood. If, however, hemorrhage does occur, a plug of absorbent cotton can easily be passed back and wedged between the cut surface and the septum, and allowed to remain until the following day, if necessary. The relief attending this operation is immediate and striking. The accom-

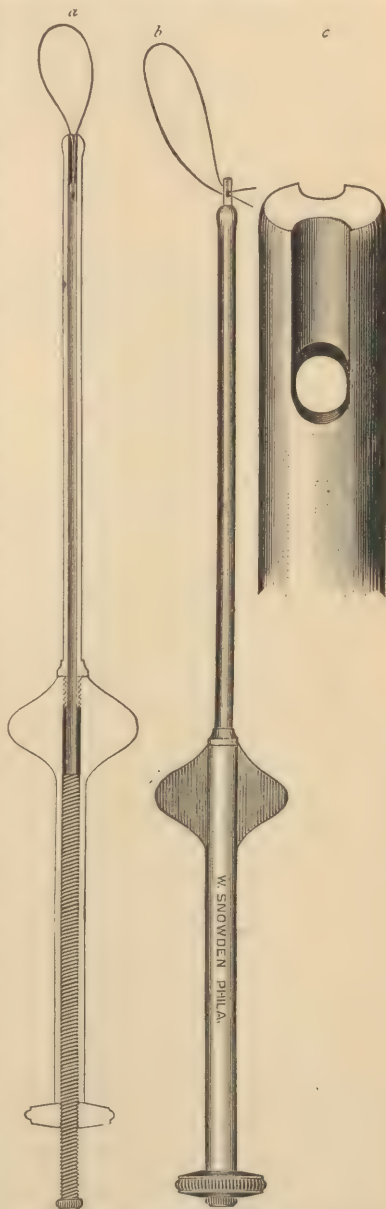


FIG. 77.—Sajous' Snare. *a*, Sectional view; *b*, snare showing the method of inserting the wire loop; *c*, distal end of the inner stem, enlarged.



panying illustration, Fig. 78, gives a side view of this posterior hypertrophy. It is a drawing by Dr. Jarvis of a morbid specimen in his possession. There is also shown in the plate the snare in position for severing the mass.

A condition not unlike this at the posterior termination of the lower turbinated bone is frequently met with, though in a far less

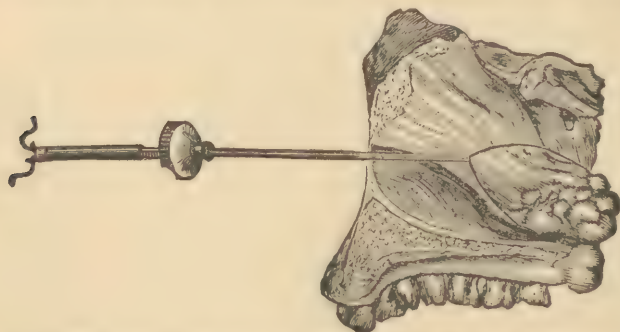


FIG. 78.—Lateral View of Posterior Hypertrophy of the Mucous Membrane of the Lower Turbinated Bone, with Jarvis' Snare in Position for Section.

degree, at the anterior termination of the same body. This consists of a rounded, puffy-looking mass, which encroaches on the lumen of the anterior nares, more or less completely filling it, and serving to obstruct materially the entrance of air.

A very simple device for removing this by means of the same snare *écraseur* has been suggested by Dr. Jarvis.<sup>1</sup> This consists of transfixing the mass from below upward and backward by a long, slender transfixion needle, either straight or slightly curved as shown in Fig. 79, and mounted in a suitable handle. The loop of the snare is then passed over the handle of the needle, and subse-

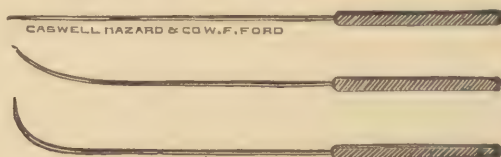


FIG. 79.—Jarvis' Transfixion Needles.

quently over its point, when that portion of the mucous membrane which has been transfixed is cut through and removed. There is thus taken out a small mass about the size of a split pea. The cut surface heals kindly, and the result, in my experience, has been invariably to relieve the condition of stenosis. This, of course, accomplishes what the forceps does, but it does it in an almost painless

<sup>1</sup> N. Y. Med. Record, vol. xxi., p. 563.

manner, and with absolutely no bruising. The hemorrhage resulting is not great, and is easily controlled by a plug of cotton inserted for a few minutes. Occasionally there will be found on the anterior extremity of the lower turbinated bone, a mass which will demand removal by the snare.

Hypertrophy of the membrane covering the middle turbinated bone occurs in a large majority of cases on its anterior termination, and occurs here as a condition rarely met with on the lower turbinated, in that it possesses a looser structure, and assumes more of a myxomatous character (see p. 135), presenting to the eye a bluish-gray appearance, between that of the nasal mucous membrane and a nasal polyp. This may develop on an otherwise healthy turbinated bone, or the bone itself may become enlarged and unrolled, as it were, on itself, in such a way as to present a large, shuttle-like prominence, projecting downward and inward, thus encroaching upon the normal lumen of the cavity. No hesitation should be felt in removing this mass, and we possess no method better than the use of the steel wire snare. The steel wire loop possesses sufficient firmness to enable the manipulator to carry it well over the mass which can be then easily severed. In many cases a portion of the bone is removed with the thickened membrane, which I think is always permissible, as probably the deformity of the bone has much to do with the development of the hypertrophy. The snare, I think, should always be used in these cases, as caustics are inadequate to their destruction. The galvanocautery loop may be used, but the cold wire is more easily manipulated and the operation is completed more rapidly.

Hemorrhage as the result of operations on the middle turbinated bone is comparatively rare, although three cases of operation in this region at my hands have been followed by this accident; the hemorrhage being exceedingly intractable, plugs not only being rendered necessary, but their removal not being feasible until the third day.

In the treatment of all cases of catarrhal disease, special stress should be laid on the enforcement of those general hygienic measures which already have been fully discussed in the chapter on taking cold. A catarrhal process is kept up oftentimes and aggravated by the same conditons which give rise to the phenomenon of taking cold. The same general hygienic laws which we have already discussed under the heading of prevention of cold should be specially enforced, therefore, on our patients under treatment for a chronic catarrhal process.

## CHAPTER X.

### PURULENT RHINITIS OF CHILDREN.

THIS expression is used to describe an affection, which is met with exclusively in children, and in which the inflammatory process is attended with a purulent discharge from the nasal mucous membrane. In literature we find it used in a somewhat vague and indefinite manner by writers, who describe a number of different diseases under this name. Thus Mackenzie recognizes two forms of purulent rhinitis, acute and chronic. Under the acute form this writer<sup>1</sup> describes that form of purulent nasal discharge, met with in infancy, which is usually ascribed to a gonorrhœa or leucorrhœa in the mother, although he questions the accuracy of this assigned cause. The chronic form of the disease, on the other hand, he<sup>2</sup> seems to think is only met with in that curious affection, which was first described by Stoerck, as found among the inhabitants of Poland, and which consists in a purulent discharge from the nostrils, with no injection of the mucous membrane, thus distinguishing it from a coryza. The disease runs a very chronic course, and is said to extend to the lower air-passages, giving rise to severe dyspnœa. In one case tracheotomy is recorded as having been rendered necessary. Stoerck regarded the affection as due to personal uncleanness.

Fränkel<sup>3</sup> describes but one form, referring apparently to the same as Mackenzie's acute variety of the disease.

Cohen,<sup>4</sup> in the chapter on chronic nasal catarrh, describes a purulent form of catarrh, as commencing in infancy, and which, running a chronic course, may develop eventually in ulceration and necrosis. Cohen attributes all these cases to a remote specific infection.

Beverley Robinson, Sajous, Lennox Browne, and Seiler make no definite allusion to the purulent form of nasal disease. A careful examination of the above authorities leads me to think, that they have entirely overlooked that form of the disease, which is the subject of this chapter.

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<sup>1</sup> "Diseases of the Throat and Nose," vol. ii., p. 294.

<sup>2</sup> Loc. cit., p. 335.

<sup>3</sup> "Ziemssen's Encyclopedia," vol. iv., p. 139.

<sup>4</sup> "Diseases of the Throat and Nose," 2d ed., N. Y., 1875.



While recognizing the existence of the acute purulent rhinitis in new-born children, as dependent, probably in many cases, on infection from the vaginal passages of the mother, we meet with a large number of cases, which commence in the earlier years of childhood, in which the disease pursues an essentially chronic course, and in which a purulent discharge is the prominent feature. It is purely local in character, dependent on no constitutional dyscrasia, and consists essentially in an increased secretion of mucus in the earlier stages, together with a rapid desquamation of epithelial cells, which, running its course as a purulent disease, in from five to ten years, develops finally into what is known as atrophic rhinitis. The disease, in fact, is the first stage of so-called dry catarrh or ozæna. From a clinical point of view, it is a very noticeable fact, in pathological processes involving mucous membranes certainly, and probably all tissues of the body, that in youth the epithelial structures are especially liable to become the seat of diseased action, whereas in adult life this tendency seems to disappear, and in place of it, there obtains a tendency to the involvement of the connective-tissue structures. Thus, in the earlier years of life we notice this tendency in the development of enlarged tonsils, and follicular disease in other portions of the air tract, as well as in the vulnerability of the lymphatic glands, whereas in adult life inflammatory changes in the mucous membranes result mainly in a true connective-tissue hypertrophy. This general law has been adduced in my own mind entirely from clinical observation, not from any special pathological study. Furthermore, in searching for some support in works on general pathology, I fail to find any direct statement to this effect. Wagner,<sup>1</sup> however, would seem rather to suggest it, for he makes the statement, that "during childhood the skin and mucous membranes are more excitable, more prone to disorders of the circulation. The function of the lymphatics is prominent in childhood, the quantity of lymph is increased, the lymphatic glands at this time have their greatest development; and in the latter we more often observe alterations of nutrition than in adults (the so-called scrofulous diseases)."

Now, this peculiar tendency in childhood shows itself in a notable activity in the development of the epithelial cells, under the stimulation of any of those causes, whose agency we recognize in the production of inflammatory processes. Furthermore, this activity in epithelial development may result in two distinct processes. In the one, we find the new epithelial cells building themselves upon the parent structures, and remaining a permanent element in the tissue. In other words, a true epithelial hypertrophy

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<sup>1</sup> "Manual of General Pathology," N. Y., 1876.



takes place, with the result of, in the case of the tonsillar gland for instance, an hypertrophied tonsil. In another case, the same activity going on in the mucous membrane, and characterized by rapid evolution of epithelial cells, we find that the epithelium is thrown off. In other words a rapid process of desquamation sets in. Now, why these new cells in the one case build themselves upon the membrane, and in the other case are thrown off, I do not suggest a reason. Certainly it is not dependent on any constitutional dyscrasia, which destroys the power of the individual cell to maintain its identity as an integral part of the membrane, for if there is any notable dyscrasia in these cases, it would seem to be more marked in those instances in which hypertrophy takes place, rather than the desquamative process. Furthermore, it is a noticeable fact in young children that acute rhinitis, referring to the form of cold in the head, which is met with in adult life, is an exceedingly rare disease. An ordinary acute inflammation of the mucous membrane of the nasal passages in a child, does not result in congestion of the mucous membrane involving the turbinated tissues. If a child has an attack of what is ordinarily called cold in the head, in a majority of instances, it is an acute inflammation, with swelling of the glands, of the vault of the pharynx, producing more or less complete nasal stenosis, from occlusion of the posterior nares. In the less frequent cases, it is the mucous membrane lining the nasal chambers. When this occurs, we notice this susceptibility already spoken of, immediately showing itself, and the superficial layer of the mucous membrane, the epithelial layer, becomes the seat of marked morbid activity, differing essentially from the process which occurs in adult life. Now, with the first attack of a cold, the symptoms may not differ in a very marked manner from a cold in adult life, but as these attacks recur, there sets in a notable tendency to a rapid proliferation of epithelial cells, which being thrown off in connection with an excessive mucous discharge, gives rise to a muco-purulent secretion. These repeated attacks of the acute disease finally develop into a chronic rhinitis, characterized by no very noticeable nasal stenosis, but by a more or less profuse purulent discharge, and the disease which is the subject of this chapter is established. Commencing, as a rule, at from three to five years of age, it runs a somewhat slow course of from ten to twelve years, when it develops into an atrophic rhinitis, the rapid desquamation of epithelial cells gradually extending to the mucous glands, robbing them of their epithelial lining, and therefore of their secreting power, and so resulting in crust-formation, and other symptoms of atrophic rhinitis, as will be more fully described when we consider the development of that disease.

It should be stated, that the morbid process, from the beginning to the end of the disease, is identical in all its features, except as to the degree of activity. It is a catarrhal process in the first year, and it is a catarrhal process always. The deeper tissue-structures are but slightly involved, and the surface layer becomes the site of but one form of diseased activity, and that consists of an epithelial desquamation together with a muco-purulent discharge. Ulceration of the soft parts, or necrosis of the bone beneath, are never, under any circumstances, a part of the progress of the disease.

In some cases, the disease commences in the first year of life, although, in these cases, there is no tendency to a more rapid development of the later symptoms. As a rule, the purulent character of the discharge is maintained until about the fourteenth or fifteenth year, although, in one case which has come under my observation, the atrophic stage with crust-formation developed as early as the eighth year of age.

ETIOLOGY.—It is a very common assertion, that atrophic rhinitis and ozæna are dependent on the scrofulous diathesis. Of course, this assertion would necessarily include this dyscrasia as the cause of the disease in question. In my own experience, children affected with this affection present a picture of rugged health, which would scarcely warrant the suspicion of any constitutional dyscrasia, nor can syphilis be said to have any influence, either in producing, or indirectly causing the disease. The clinical history of syphilis presents a series of symptoms, of a totally different character. Many forms of catarrhal disease in children have their origin in an attack of scarlet fever, measles or some other of the exanthemata. My experience is, that a purulent rhinitis rarely commences in this way. On the contrary, the catarrhal affections which have their origin in a febrile attack, are characterized by hypertrophic changes. In fact, I find but very few instances of the disease we are considering, recorded among my notes, as having commenced in this way. I know of no assignable cause for the disease, other than taking cold, and this we explain by the neglect of the ordinary hygienic rules of proper living, as already discussed in a previous chapter.

SYMPTOMS.—The prominent symptom of the disease, is a muco-purulent secretion, generally of a bright yellow character, and having its source from both nostrils. This is expelled in considerable quantities into the handkerchief, and also makes its appearance about the nostrils, constituting what is often called a "dirty nosed" child. There is no especial obstruction to the nasal passages, except as the result of the accumulation and drying of the secretion about the anterior nares. The discharge is generally

through the nostrils, although more or less of it is drawn down or makes its way into the fauces. During sleep the secretions are apt to accumulate to such an extent as to cause mouth-breathing. The child, of course, is liable to take cold, during which there are exacerbations, and the attack is attended with a more profuse discharge containing a large amount of serum. During the exacerbation sneezing is a rather prominent symptom, though at other times it is not present, the sensibility of the nose being diminished rather than increased. Fetor, so prominent a symptom in the atrophic stage of the disease, is never present while the discharge remains fluid and moist.

DIAGNOSIS.—A rhinoscopic examination anteriorly, reveals the mucous membrane covering the turbinated bones somewhat swollen, and of a reddish tint, with perhaps the appearance of a mild subacute inflammation, but rarely presenting the active turgescence, and bright red appearance of an acute inflammatory process. Coating the faces of both the lower and middle turbinated bodies will be seen flakes and strings, and even large masses of bright greenish-yellow muco-pus, in a semi-fluid state. An examination of the fauces will show muco-pus coating the posterior wall of the pharynx, and trailing down its wall in stringy masses. This condition, however, it should be remembered, is also seen in connection with disease of the adenoid glands of the vault of the pharynx. An examination of the vault of the pharynx, however, will usually reveal whether any morbid condition exists there to account for this post-nasal discharge.

The diagnosis, however, is not based on the rhinoscopic examination alone, but can easily be made both from the objective symptoms, and by elimination. A purulent discharge is met with in children as the result of strumous ulceration and necrosis, the presence of foreign bodies, blennorrhœa, diphtheria, and the late stages of acute rhinitis met with in connection with the exanthemata. If there are any other causes, they are of exceeding rare occurrence. Syphilitic or scrofulous disease gives rise to an exceedingly offensive discharge of pus, mingled with blood, from one or both nostrils, but it is accompanied by so many marked symptoms of the blood-poisoning, that a mistake in diagnosis need not be made. A foreign body in the nose gives rise to a purulent discharge, as a rule, from but one nostril. A purulent rhinitis invariably involves both sides. Furthermore, inspection and examination with a probe should always eliminate this source of error. Blennorrhœa occurs as a rule in the new-born child, and is characterized by an activity of the morbid process both as regards the amount of discharge, and the swollen condition of the membrane, as to render







These cleansing lotions are best used by means of a small single-bulb atomizer, such as is sold in the drug-stores, the best of which perhaps is that shown in Fig. 47. This should be used at the commencement of treatment at least three or four times daily, the wash being thrown into both nostrils, and the child being taught to cleanse the passages as thoroughly as possible by blowing the nose immediately after. In lieu of the atomizer an ordinary ear-syringe may be used, but as a rule I think the atomizer preferable.

After the membrane is thoroughly cleansed, an astringent should be used in the same manner, by means of the syringe or atomizer, preference being given to those agents which possess the property of controlling cell-proliferation.

For this purpose we may use one of the following:

R Zinci sulpho-carbolat., . . . . gr. xx.  
 Hydrarg. chloridi corros., . . . . gr.  $\frac{1}{2}$ .  
 Aquæ, . . . . ad  $\frac{3}{4}$  iv.

M.

Or,

R Acidi borici, . . . . 3 ij.  
 Aquæ, . . . . ad  $\frac{3}{4}$  iv.

Or,

R Acidi salicylic., . . . . gr. iv.  
 Aquæ, . . . . ad  $\frac{3}{4}$  iv.

To any of the above there may be added, with benefit, one of the simple astringents, or they may be used alone, in order of preference as follows:

Glycerole of tannin, . . . . 3 i. to  $\frac{3}{4}$  i.  
 Argenti nitrat., . . . . gr. ij. to  $\frac{3}{4}$  i.  
 Zinci sulphat., . . . . gr. v. to  $\frac{3}{4}$  i.  
 Cupri sulphat., . . . . gr. ij. to  $\frac{3}{4}$  i.  
 Aluminis, . . . . gr. x. to  $\frac{3}{4}$  i.

The effect of these agents should be noted, and a change in the special drug employed occasionally made, as it would seem that even the best of local remedies lose to a certain extent their effect from long usage. Occasionally good results will be obtained by the use of ordinary skimmed milk, or even better still, buttermilk. These may be used pure or in combination. To equal parts of lime-water and buttermilk may be added sulpho-carbolate of zinc of a strength of two grains to the ounce. Permanganate of potash is a remedy of a certain amount of value in controlling cell-proliferation, and may be often used with benefit, in the strength of three to five grains to the ounce.

Watery solutions are to be preferred, in the treatment of these

cases, to other forms of medication. Inhalations and vapors are probably without effect. Powders, however, for convenience of use, may be used with benefit, the patient being directed to carry a box in his pocket for frequent application. For use in this way boracic acid may be used in full strength, or one of the following:

℞ Iodol.,  
Mag. carb., . . . . . āā  $\frac{3}{4}$  ss.

M.

Or,

℞ Hydrarg. chlor. mitis, . . . . . 3 ss.  
Bismuthi subnitrat., . . . . . ad  $\frac{3}{4}$  i.

Or,

℞ Zinci oxidi, . . . . . 3 i.  
Bismuthi subnitrat., . . . . . ad  $\frac{3}{4}$  i.

Or one of the following astringents may be used, incorporated with any unirritating powder, such as starch, lycopodium, sugar of milk, etc.:

Acidi tannici, . . . . . gr. x. to  $\frac{3}{4}$  i.  
Plumbi acetatis, . . . . . gr. ij. to  $\frac{3}{4}$  i.  
Argenti nitratis, . . . . . gr. i. to  $\frac{3}{4}$  i.  
Cerii oxalatis, . . . . . gr. xx. to  $\frac{3}{4}$  i.

In addition to local treatment, general hygienic measures are especially indicated in these cases, not perhaps from any features belonging to the disease itself, but rather on account of the tender age of the patients with whom we have to deal, and their peculiar vulnerability to changes of temperature. These measures are embraced briefly under the injunction that a daily cold sponge-bath should be used to the waist; absolutely pure, all-wool flannels, worn next to the skin in summer and winter; together with the other general directions as to sleeping apartments, clothing, exercise, etc., which have been given in the chapter on taking cold.

Internal medication is not indicated, and yet it has been my habit for some years past, perhaps as a matter of routine, to administer cod-liver oil. As stated before, the general health is not impaired in these cases, and yet cod-liver oil seems to exercise a certain amount of controlling influence on the disease, and I think it should be given, provided it is well tolerated, and does not interfere with the digestion.

## CHAPTER XI.

### ATROPHIC RHINITIS.

IT will be noticed that we embrace all forms of catarrhal inflammation of the nasal mucous membrane under really the two heads, atrophic and hypertrophic. This distinction was first, I think, suggested by Fränkel,<sup>1</sup> although he did not attempt to elaborate the distinction between the two forms of disease, rather indorsing the view that the atrophic form was but the later stage of the hypertrophic. That this view is incorrect has already been suggested in the previous chapter. The distinctive character of atrophic rhinitis was, I believe, first pointed out by myself, in a paper read before the Seventh Session of the International Congress of London in 1881.<sup>2</sup> The view there laid down I still regard as the true explanation of the development of the disease. Commencing in a desquamative inflammation of the nasal mucous membrane, there is set up the disease described in the previous chapter, under the name of purulent rhinitis, which, as was there suggested, constitutes the early stage of the disease under consideration. We may describe atrophic rhinitis, then, as that form of catarrhal inflammation of the nasal mucous membrane which, developing in the direction of a glandular atrophy, leads eventually to a more or less complete destruction of the muciparous glands and follicles, together with a true cirrhotic condition of the mucosa proper, resulting in a condition of the nasal mucous lining, in which the prominent and characteristic symptom consists in the formation of crusts and scabs, which lodging in the sinuous passages of the nose, undergo decomposition, and become the source of a fetid and offensive odor.

The progress of the disease as a purulent rhinitis has already been fully described. In that chapter it was stated that the predominating morbid condition consisted in the desquamation of epithelium from the surface of the mucous membrane. Now, as long as this desquamation is confined to the superficial epithelial cells, we can easily understand that the disease is attended with a thin and fluid muco-purulent discharge. Naturally, however, the morbid process will not confine itself to the superficial layer of the

<sup>1</sup> "Ziemssen's Encyclopedia," vol. iv., p. 138.

<sup>2</sup> Transactions, vol. iii., p. 329.

membrane, but there soon occurs an involvement of the glands, by which this desquamative process extends to these elements of the membrane, resulting in a certain amount of loss of secreting power. As soon as the glands have become seriously impaired, as to their function, by this epithelial loss, we find the secretion becoming, to a certain extent, limited; the muco-purulent discharge assumes a more inspissated character, and lodging upon the convex surfaces of the turbinated bodies, dries and forms a closely adhering film, clinging to the membrane in such a way as to interfere with the vascular circulation. The mechanical action of this dried film is not unlike that of collodion, for in drying, it contracts, and embraces the turbinated bones in a grasp which necessarily must interfere with the circulation of blood in the venous sinuses. The action of this, as we see, is far-reaching. The circulation of the blood in the large venous sinuses of the turbinated bodies being hampered, the great and important respiratory function of the nasal mucous membrane is more or less completely arrested; the exosmosis of serum ceases, or is markedly diminished. The result is obvious. The muco-purulent secretion is no longer diluted by the amount of serum which is normally exuded, and the tendency to muco-purulent inspissation, and crust-formation, is markedly increased. Furthermore, the nutrient arterial supply of the membrane is also shut off in such a manner as to promote a degeneration of the tissue, by which the atrophic process is still further accelerated. As the disease progresses, we have still another element added, in the atrophy of the turbinated bones themselves. As we know, the periosteum of the turbinated bones is the deep layer of the mucous membrane. As the result of impeded circulation, due to the adhering crusts already described, the circulation of the blood in the deep layer of the membrane is so far arrested as to rob the bone itself of its normal nutrient blood-supply, thus causing an atrophy, by which eventually the bones disappear more or less completely from the nasal cavity, leaving only small and scarcely recognizable ridges on the outer wall. We have here, I think, a rational theory of the development of purulent rhinitis, and ultimately of atrophic rhinitis, which harmonizes fully with the clinical history of the disease, and affords a rational explanation of the symptoms which characterize its various stages of development.

We have thus established, under the name of atrophic rhinitis, a disease which probably comprises a large number of the cases which have heretofore been embraced under the general term of *ozæna*. It may be repeated, in this connection, that this term is one used to describe a symptom, and not a disease, and by earlier writers has been used to describe all diseases of the nasal cavity



characterized by an offensive discharge, and a fetid odor. With our increased knowledge of intranasal disease, and the advancement in our methods of diagnosis, the term *ozæna*, as describing any definite form of nasal disorder, of course, disappears from our literature.

Michel upholds still, I think, the view advanced in his excellent work on diseases of the nose,<sup>1</sup> that a purulent discharge from the accessory sinuses may give rise to the disease under discussion. I question if disease of the accessory sinuses ever gives rise to other than a discharge of fluid pus, which remains fluid until it is expelled from the cavity, nor, in its passage through the nose, does it cause any morbid condition in the nasal membrane. Lowenburg<sup>2</sup> considers the disease due to a micro-organism of large dimensions, which burrows deeply into the membrane, and is thus not removable by applications, although Habermann<sup>3</sup> in a series of microscopical examinations did not discover these organisms. The theory, however, is supported by Noquet,<sup>4</sup> of Lisle. Thost<sup>5</sup> also claims to have found diplococci in the secretions from *ozæna*. These observers undoubtedly laid too much stress on the micrococcus as a cause of the disease. It is undoubtedly present in the secretions in atrophic rhinitis, but as the result of decomposition, for it must be remembered that these crusts, which are the source of the fœtor, have remained in the nasal cavity in many cases for several days, and necessarily have undergone putrefactive changes, of which the presence of micro-organisms are an essential feature. My own view, as originally advanced, was based both on clinical observation, and on the result of microscopic study of portions of the membrane, removed from the nasal cavity during life.

**PATHOLOGY.**—The changes as involving the three layers of the membrane (see Fig. 80) may be described as follows:

*The Epithelial Layer.*—The epithelial layer is considerably decreased in width. The outer, nearly smooth surface is occupied by a relatively broad layer of flat epithelia, partly in a state of desquamation, and entirely devoid of cilia. Below this, there is found stratified cuboidal epithelium, displayed in five or six layers, while the portion nearest to the adenoid tissue, in some portions at least, is occupied by a row of columnar epithelium. Where the latter is plainly visible, the boundary line between the epithelial coat and the adenoid tissue is distinctly marked. In many places,

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<sup>1</sup> "Krankheiten der Nasenhöhlen," Berlin, 1876.

<sup>2</sup> L'Union Médicale (3d Series), 1884.

<sup>3</sup> Zeitschrift für Heilkunde, Bd. 7, 1886.

<sup>4</sup> Revue mensuelle de laryngologie, May, 1887.

<sup>5</sup> Hamburg Society of Physicians, May 17th, 1887.

however, the boundary line cannot be traced, and the adenoid seems to blend with the covering epithelium, while the latter exhibits features similar to those of the adenoid tissue.

*The Adenoid Layer.*—The adenoid layer is thinner in diameter than normal, and is occupied by crowded lymph-corpuscles, in a very delicate fibrous reticulum. The capillary blood-vessels are small, scantily distributed and, as a rule, quite empty. The acinous glands are small, and evidently diminished in number. They are lined by a short columnar or cuboidal epithelium, while their ducts exhibit,

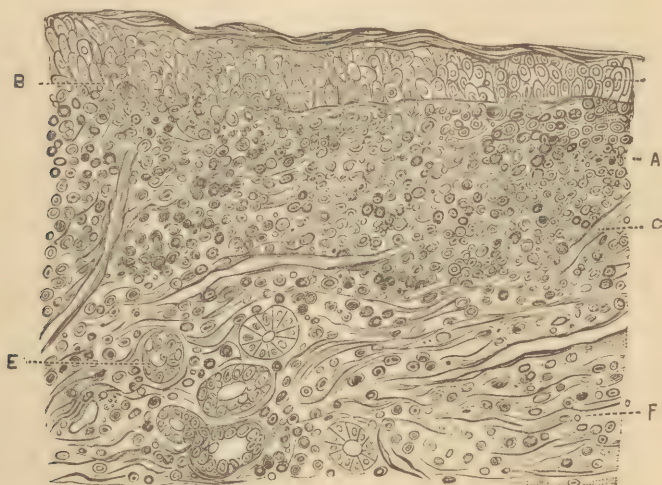


FIG. 80.—Atrophic Rhinitis. *A*, Adenoid layer; *B*, epithelial layer; *C*, empty blood-vessel; *E*, acinous layer; *F*, submucous connective-tissue layer, the remains of the previously existing cavernous tissues.

around a large calibre, well-defined columnar epithelium. Around the scanty acinous glands there are heaps of lymph-corpuscles.

*The Submucous Layer.*—The adenoid layer merges into a layer of a more fibrous construction, with relatively less numerous lymph-corpuscles. There is a larger number of blood-vessels found in this layer, which on an average exhibit a wider calibre than those of the adenoid tissue.

The prominent features of the atrophic process then are briefly as follows:

*First*—Decrease of covering epithelium, with profuse desquamation.

*Second*—Decrease of the adenoid layer, with lack of blood-vessels, together with destruction of the acinous glands.

*Third*—A total disappearance of the venous sinuses of the submucous layer of the membrane.

In brief, we find here an atrophy of the mucous membrane, in

which the morbid process is not due to a connective-tissue hypertrophy encroaching on the glandular structures of the membrane, but rather to the transformation of epithelial structures into inflammatory corpuscles, together with an active epithelial desquamation from the surface of the membrane, and from the lining of the acini.

As has been seen, the follicles are surrounded by heaps of lymph-corpuscles, but there is no evidence of transformation of these corpuscles into connective tissue, showing thus that the inflammatory process is most marked in the neighborhood of the acini, but that it does not develop into a hyperplastic process. The morbid changes are, therefore, atrophic from their outset, and bear no relation whatever to the hypertrophic form of the disease.

I am cognizant of no other investigations of like character, made on the living subject, although Fränkel, Gottstein, Krause, Hartmann, and Habermann have all made microscopical study of the pituitary membrane in this disease, from the dead subject. The results of their investigations do not differ materially from my own.

Fränkel<sup>1</sup> finds the lesion to consist essentially in the disappearance of Bowman's glands, the mucous glands of the lower turbinated bone remaining unchanged. Gottstein<sup>2</sup> finds thickening of the connective tissue about the glands, with cloudiness of the epithelial lining. Krause<sup>3</sup> finds a fatty degeneration, both of the mucous membrane, and of the gland-epithelium. Habermann<sup>4</sup> believes the lesion to consist of a fatty degeneration of the gland-epithelium, not alone of Bowman's glands, but of the acinous glands, thus partially coinciding with Krause.

These views, it seems to me, are important, as affording us a probable explanation of the epithelial desquamation, which characterizes the earlier stage of atrophic rhinitis, for although my own studies fail to reveal evidences of this fatty degeneration, some explanation was needed to account for the desquamative process. If this fatty degeneration is found in a large number of cases, we need seek no further for a cause for the desquamation.

ETIOLOGY.—We have already discussed the question of causation of purulent rhinitis, and this disease I believe to be, in every case, a cause of, or the primary stage of the atrophic form. Allusion has already been made to the statement, that atrophic rhinitis develops as a later stage of the hypertrophic form. Fränkel,<sup>5</sup> as before stated, was, I think, the originator of this idea, which has

<sup>1</sup> Virchow's Archiv, vol. lv.

<sup>2</sup> Breslau Aertzl. Zeitschrift, Sept., 1879, Nos. 17-18, p. 6.

<sup>3</sup> Transactions International Medical Congress, London, 1881, vol. iii., p. 311.

<sup>4</sup> Loc. cit.

<sup>5</sup> Loc. cit.



been followed very generally by subsequent writers. Thus, Mackenzie<sup>1</sup> says, "Atrophy appears to be always a secondary affection, or in other words the changes are of a quasi-cirrhotic character, resulting from previous inflammatory thickening." He also quotes Schäffer's assertion that he has "followed cases through from the hypertrophic to the atrophic stage;" while Sajous<sup>2</sup> is more guarded in his statements, and says that "atrophy of the mucous membrane of the nose occurs as an occasional result of hypertrophy." Seiler<sup>3</sup> also guards his statement, by saying that "dry catarrh may either be a sequence to the hypertrophic stage, or it may be of the atrophic variety from the start." Wagner<sup>4</sup> also states that "Ozæna is merely a later stage of chronic rhinitis," and also reports a remarkable case,<sup>5</sup> in which the atrophic variety of the disease had supervened upon the hypertrophic, between the "spring of 1881" and the "following autumn." Schäffer, as already quoted above by Mackenzie, asserts that "the hypertrophic stage lasts from eight to ten years before the atrophic stage sets in." Schech<sup>6</sup> in discussing this point, while not making the sweeping assertion of Mackenzie, states that "numerous observations go to prove that, in the majority of cases, atrophic rhinitis is preceded by the hypertrophic stage." Lennox Browne<sup>7</sup> gives us, a trifle more in detail, the rationale of this process, in the statement that "congestion and hypertrophy may, after a longer or shorter time of perverted growth and secretion, lead to an increase of the connective-tissue elements of the membrane; these ultimately contract and culminate in fibroid shrinking, and in atrophy of both membrane and bones."

If we look carefully into the views above expressed, I think it will be noticeable that these writers content themselves with accepting Fränkel's original view, without stopping to question seriously the grounds on which it was based. Furthermore, a full examination of their writings shows a striking absence of careful clinical observation to establish the teaching. The only clinical support that I have been able to discover, are the observations of Wagner and Schäffer, the one having discovered this change to have taken place in a child of fourteen at the expiration of about six months, while the latter asserts that it only takes place after the expiration of ten years or more.

<sup>1</sup> "Diseases of the Throat and Nose," Philadelphia, 1884, vol. ii., p. 331.

<sup>2</sup> "Diseases of the Nose and Throat," Philadelphia, 1886, p. 114.

<sup>3</sup> "Diseases of the Throat," Philadelphia, 1883, p. 256.

<sup>4</sup> "Diseases of the Nose," N. Y., 1884, p. 84.

<sup>5</sup> *Op. cit.*, p. 93.

<sup>6</sup> "Diseases of the Mouth, Throat and Nose," English Ed., Edinburgh, 1886, p. 238.

<sup>7</sup> "The Throat and its Diseases," 2d ed., London, 1887, p. 502.



Now, I have studied my own cases very critically, and without further discussing the question, I find it a universal, general rule, that in one case purulent rhinitis is a disease of childhood, and atrophic rhinitis of adult life; that purulent rhinitis develops into atrophic rhinitis very rarely later than the twentieth year, and in the majority of cases earlier than the sixteenth; and, furthermore, on carefully investigating the clinical history of the cases of atrophic rhinitis which have been under my own observation, I have failed to discover any evidence that the hypertrophic form of the disease had ever existed before the patient came under my care. Now, there can be no question, but that a large number of our cases of hypertrophic rhinitis come under treatment between the ages of twenty-five and thirty-five. If it is possible that this disease can result in the atrophic form in six months according to Wagner, or in ten years according to Schäffer, our clinical records certainly would show some evidence of it. I have never seen a case of atrophic rhinitis which developed its atrophic symptoms later than the twenty-fifth year.

Zaufal<sup>1</sup> I think is alone in the view, that atrophic rhinitis or ozæna is due to congenital deficiency in the turbinated bones. This curious theory is certainly based on careless observation, for the atrophy of the turbinated bones only occurs in the late stages of the disease, and is rarely met with before puberty. Zuckerkandl<sup>2</sup> finds in an examination of two hundred and fifty-two skulls of children no single case of congenital atrophy. Chatellier<sup>3</sup> believes the atrophy of the turbinated bones to be due to a rarefying osteitis. Gellé,<sup>4</sup> on the other hand, does not believe there is an osteitis, but refers the atrophy to interference with nutrition.

Chatellier's idea naturally suggests a general dyscrasia, whereas, as already stated, I think these cases are rarely, if ever, attended by any evidence of impaired general nutrition. Gellé, however, would seem to have arrived at something of the same conclusion which has been advocated by myself.

What has been said as to the causation of purulent rhinitis, applies of course to the atrophic form of the disease. In the chapter on the former, the statement was made with marked emphasis, that atrophic rhinitis bore no possible relation to syphilis in any of its stages or manifestations. The same broad statement may be made in regard to tuberculosis and scrofula, and yet we find Schäffer<sup>5</sup> making the statement, that in one hundred and

<sup>1</sup> Aertzl. Correspondenzblatt, 1874, No. 33; *ibid.*, 1877, No. 24.

<sup>2</sup> "Normale und Pathologische Anatomie der Nasenhöhlen," Vienna, 1882.

<sup>3</sup> French Society of Otolaryngology, April, 1887.

<sup>4</sup> *Ibid.*

<sup>5</sup> *Op. cit.*

nineteen cases, he found ninety-nine of strumous, and twenty of syphilitic origin. In two cases the complaint was distinctly due to hereditary syphilis; while Wyss<sup>1</sup> makes the statement, that more than half of his cases of ozæna had a tuberculous history, but he found very few cases complicating phthisis. By the term ozæna he excludes all cases of syphilitic or carious disease of the nose.

SYMPTOMATOLOGY.—The symptoms which characterize the disease, are the direct result of the apparent increase of secretion, and of the impairment of function of the mucous membrane. This increase of secretion, however, is only apparent. As a fact, the gross amount of normal sero-mucous discharge from the nose, being principally a serous exosmosis, is decreased, while at the same time there is an increase of the flow of mucus, which being mixed with epithelial cells, constitutes a muco-pus discharge. On account of the limited amount of serous exosmosis, this discharge becomes so far thickened that it lodges within the cavity, or is expelled with considerable effort through the anterior nares. When the atrophic process has become fully developed, we find, as before stated, crust-formation the prominent symptom of the disease. The presence of these crusts in the nasal cavity gives rise to more or less irritation, as of the presence of a foreign body, although this is not specially notable, since the sensibility of the membrane is to an extent diminished, and their presence is, therefore, often tolerated and not a source of discomfort. Occlusion of the nares is the result of the accumulation of dried crusts, and is often present, especially noticeable in the morning when the patient has passed some hours without voluntary effort at clearing the passages.

As soon as this tendency to dryness has so far developed that these crusts are retained in the cavity for from twenty-four to forty-eight hours, we have, as a necessary consequence, the development of fetor, which always constitutes the most prominent, and probably the most distressing feature of the disease. This fetor is of a somewhat peculiar character, which cannot well be described, but to one familiar with the disease, is easily recognized as differing essentially from the nauseous intolerable odor of necrosis. It is a musty, graveyard-odor, containing just sufficient of the fetid hydrogens to give it a decidedly fetid character. This odor, it seems to me, undoubtedly arises from the decomposition which takes place in the animal matter contained in the viscous, inspissated, muco-purulent discharge from the nasal mucous membrane. This, lodging in the cavity for a sufficient length of time, and exposed to the air, undergoes the same process which characterizes all animal

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<sup>1</sup> "Clinical Investigations of Aural Complications of Ozæna." *Centralblatt für Laryngologie*, vol. iii., No. 12, p. 519.

matter, under the same conditions. A number of theories have been propounded in explanation of this peculiar fetor of atrophic rhinitis, and yet none of them seem to me so simple and altogether rational as the above. Fränkel<sup>1</sup> suggests the possibility of a special ferment as the cause of the odor. As we generally understand it, fermentation is a vital process, and not attended with the ordinary phenomena of decomposition, especially the evolution of fetid gases. Fournier<sup>2</sup> believes the odor is due to a specific secretion of the glands of the pituitary membrane, likening the fetid odor of ozæna to that which is occasionally observed in connection with the feet. This is ingenious, but I believe it is a universal rule that a fetid secretion does not occur in nature. An excretion may be fetid, but never a secretion.

Epistaxis occasionally occurs as the result of the erosions produced by the presence of the dry incrustations, especially on the septum. This, however, is rather rare. These erosions, it should be stated, are of a trivial character and never, under any circumstances, develop into anything resembling an ulcerative process, although they may occasionally develop into small perforations of the cartilaginous septum, leaving permanent communication between the two sides. Mackenzie<sup>3</sup> explains these perforations by the habit of picking the nose, which patients resort to, in order to remove the accumulated crusts.

Dryness of the pharynx becomes a prominent symptom of the disease very early in its history, due to the fact that the inspired air passes through a nasal cavity, whose walls are largely covered by dry mucous crusts, thus failing to receive its proper amount of moisture. The result of this impact of the inspiratory current on the vault of the pharynx, is to rob the mucus there secreted of its water, and thus produce a mass of dry inspissated mucus, which forms a thick plug in the upper pharynx, which hanging down behind the palate; causes a sense of irritation and discomfort, its presence giving rise to vigorous efforts of expulsion. The lower pharynx also becomes parched as the result of the same process, and presents a dry, glazed appearance, swallowing being thereby rendered somewhat difficult, in the absence of a properly lubricated pharyngeal wall. This abolition of the respiratory function of the nose, causing an abnormal dryness of the inspired air, causes also more or less irritation of the larynx and bronchial tubes, not sufficient as a rule to give rise to a bronchitis, but rather to a constant sense of irritation due to the fact that the normal mucous secretion becomes dry, and lodging in the passages, gives rise to a

<sup>1</sup> Trans. International Med. Congress, London, 1881, vol. iii., p. 302.

<sup>2</sup> *Ibid.*, p. 306.

<sup>3</sup> "Diseases of the Throat and Nose," vol. ii., p. 329.



constant hawking or hemming by which the patient attempts to clear the throat. Hoarseness is often present, and impaired vocal function always.

A form of laryngitis has been described by writers, notably Lennox Browne,<sup>1</sup> characterized by the formation of dry crusts in the larynx and trachea. The implication seems to be, that a diseased condition really exists in these parts. As a rule, it is difficult to determine any notable morbid lesion here, and I should rather lean to the view that it was purely a symptomatic affection. Spasm of the glottis, of a very distressing character, I have met with in connection with atrophic rhinitis. Several of these cases were in young women of highly nervous organization, while in others, I have seen it in men of full habit, and vigorous health, with no suspicion of neurotic tendencies. In these cases it has disappeared by vigorous measures directed to the nose. Its occurrence can only be explained by the presence of inspissated mucus or pus in the larynx acting as a foreign body.

Moderate impairment of hearing occurs in the later stages of this disease in probably a large proportion of cases, while a graver form of deafness is not an infrequent complication. Wyss, of Geneva, in an examination of sixty cases of the disease, found ear trouble in forty-seven, including, probably, all cases of moderate diminution of hearing distance. Burnett,<sup>2</sup> of Philadelphia, found an atrophic condition of the nasal mucous membrane in fourteen and one-half per cent of cases of chronic catarrhal otitis media. Beverley Robinson,<sup>3</sup> without giving definite statistics, makes the statement that aural complications are met with in atrophic rhinitis, far more frequently than in hypertrophic. Buck, Roosa, and Mittendorf apparently make no distinction between the two forms of rhinitis, as causing ear-complications.

I have always regarded hypertrophic rhinitis as a very active cause of middle-ear troubles, in the manner already described in the chapter on that disease, and am disposed to think it the more frequent cause of the more serious cases. Certainly in a given number of cases of grave impairment of hearing, the number due to the hypertrophic disease outnumbers those due to the atrophic disease in far greater proportion than the comparative frequency of the two affections. Furthermore, when we consider the success of our treatment of hypertrophic rhinitis, and our failure to more than relieve the atrophic form, it would seem that my own observation as regards the relative frequency of these causes of ear

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<sup>1</sup> "The Throat and its Diseases," London, 1887, p. 278.

<sup>2</sup> Medical Record, vol. xxviii., p. 134.

<sup>3</sup> Trans. Amer. Laryngological Association, 1883, p. 140.



disease, is the correct one. The manner in which hypertrophic rhinitis acts to produce middle-ear disease, has already been described, and would seem clear and direct. On the other hand, the action of the atrophic form of the disease in producing ear complications does not seem so clear. Woakes' attributes the aural changes quite as much to an atrophy of the tubal muscles from impaired nutrition, as to an atrophic process in the mucous lining of the tubes, this atrophy of the muscles resulting in a condition in which ingress and egress of air is impeded by the flaccid and collapsed tubal walls. Woakes' theory is ingenious, but involves the necessity of conceiving a condition of things which is hardly rational. Purulent rhinitis, and its resultant atrophic form, belongs simply to the nasal passages and never extends beyond. All its symptoms and complications result from the abolition of function in the nose, beyond which it never extends as an atrophic process. We may say of the ear, as we do of the bronchial tubes, that its integrity is dependent on the condition of healthy functional activity in the nasal passages, and that a morbid condition in this region makes itself felt very quickly in the auditory apparatus. In fact, I am disposed to think that the ear is quite as dependent upon healthy nasal passages as the bronchial tubes. In other words, the air which reaches the orifice of the Eustachian tubes, should reach that region through the nose, and be at normal atmospheric pressure, of the temperature of the body, and in a state of saturation. Any departure from these conditions involves danger both to the ear and to the bronchial tubes.

DIAGNOSIS.—An examination anteriorly will reveal on first inspection each cavity more or less filled with greenish-yellow crusts, lying upon the faces of the lower and middle turbinated bones, and bridging across the intervening space to the septum. These crusts present an appearance which is absolutely characteristic of atrophic rhinitis, in their peculiar greenish-gray tint, thus differing essentially from the crusts found in ulceration and necrosis, which are mingled with blood, unhealthy pus, and necrotic tissue. These crusts are generally found in the front portion of the nasal cavity, while an examination by posterior rhinoscopy will show the turbinated bones comparatively clean. If now the crusts be removed by the forceps or probe from the surfaces of the turbinated bones, there will be found underlying them, and apparently oozing from the fissure between the lower and middle turbinated bones, and also from beneath the upper, healthy-looking whitish yellow muco-pus. After thoroughly cleansing the cavity by means of the syringe or coarse spray, if the disease is in its earlier stages, we find the mucous

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<sup>1</sup> "Post-Nasal Catarrh," Amer. Ed., Philadelphia, 1884, p. 147.

membrane over the lower and middle turbinated bones presenting a fairly healthy aspect, normal in color and contour. Thus far, the only evidence of the disease which we have met with, is in the characteristic crusts. In the later stages of the disease, however, we find on thoroughly cleansing the cavity, the membrane covering the lower and middle turbinated bones presenting a somewhat bloodless appearance, and adhering closely to the turbinated bones beneath, and having the appearance of a thin, and somewhat attenuated membrane, while the bones themselves, according to the stage of the disease, present a shrunken and atrophied appearance,

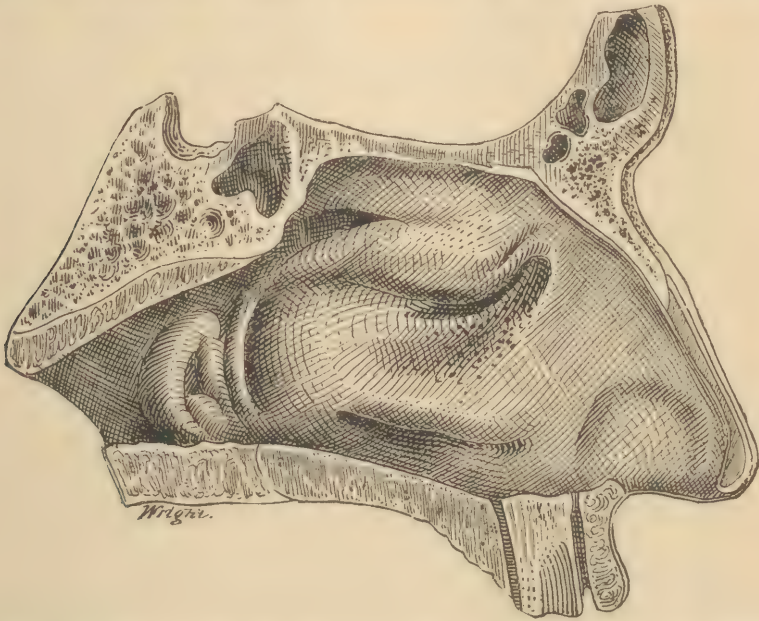


FIG. 81.—The outer wall of the nasal cavity in the late stage of atrophic rhinitis, the mucous membrane, and also the lower and middle turbinated bones, having undergone the atrophic process.

leaving a noticeably large roomy cavity, through which the wall of the pharynx may easily be recognized. In advanced cases the turbinated bones may even be difficult to find, presenting simply small, cord-like protuberances along the outer wall of the cavity, as seen in Fig. 81.

An inspection of the pharynx, both in the early and late stages of the disease, will show a dry, glazed, parchment-like condition in its lower portion, while in the vault will be noticed a plug of thick mucus, adherent to the pharyngeal roof and more or less discolored by the dust of the inspired air, which has not been arrested in its passage through the nose. The larynx and trachea present a fairly normal appearance, unless there are visible flakes of inspissated

mucus, or in rarer cases dry incrustations. The membrane lining these cavities may be somewhat congested, presenting evidences of a condition of chronic hyperæmia, but rarely of a catarrhal inflammation.

PROGNOSIS.—When we consider the essential character of the disease, we can easily appreciate that we have to deal with an exceedingly obstinate affection, and one which in most cases will resist all treatment. The question presents, Can we cure it? Fränkel, of Berlin, very frankly says: "A cured ozæna is unknown to me," referring to atrophic catarrh. In the early stage of the disease, before the fetid symptoms have set in, I have seen cases recover. In the advanced stages, characterized by fetor, and in which the turbinated bones have almost entirely disappeared, I have not seen a case cured, if, by a cure, is meant a condition secured in which there remains no necessity for any measure of local treatment. All cases can, I believe, by thorough and painstaking treatment, be brought to that point when, by the use of very simple means, the ground that has been gained can be secured, and the patient be kept entirely free from any annoying symptoms, as long as he continues to make use of some simple cleansing lotion, applied three or four times daily, but we are never justified in holding out to our patient any hope of a genuinely radical cure.

TREATMENT.—The first indication in the treatment of the disease is, of course, the thorough cleansing of the cavities, by the removal of all the incrustations. In the accomplishment of this end, there is no special virtue in any remedy, or local agent. The literature of the subject embraces a formidable array of drugs, among which are prominent, carbolic acid, salicylic acid, boracic acid, permanganate of potash, phosphate of soda, bicarbonate of soda, thymol, borax, etc. The essential requisites of a good cleansing lotion, are secured by the use of any solution which is alkaline and is disinfectant. The fluid should be alkaline for its solvent action upon mucus. It should be disinfectant, in order to neutralize the results of the process of decomposition, which is going on in the retained secretions. Any fluid, then, possessing these qualities, is an efficient cleansing solution. The formula I generally prefer is the Dobell's solution, as follows:

R	Acidi carbolici,	.	.	.	.	.	.	gr. xij.
	Sodii bicarb.,	.	.	.	.	.	.	3 ss.
	Glycerini,	.	.	.	.	.	.	3 ij.
	Sodii biborat.,	.	.	.	.	.	.	3 i.
	Aquæ,	.	.	.	.	.	.	ad Oi.

M.

Of quite as much importance is the method by which the



cleansing is accomplished. The most efficient douche we possess is the ordinary post-nasal syringe. By means of this instrument, a stream can be driven with great force through the cavities. In ordinary cases, this is sufficient to thoroughly detach all the crusts, and cleanse the parts. In advanced cases, however, it will be necessary to use a probe wrapped with a pledget of cotton. This can be passed through the nostril, and along the turbinated bones, thereby separating the crusts, after which they can be easily washed out with the syringe. Occasionally it will be necessary to throw a stream through the nostril, by means of an ordinary ear-syringe. The essential point is to remove all secretions from the nose, and the success of the manipulation can only be determined by repeated inspections by means of a good illumination, and with the anterior nasal speculum in place. After the parts are thoroughly cleansed, the next step consists in the application of a stimulant agent. If the disease is essentially an atrophic process, and the fetor is due to a process entirely outside of the membrane, then the rational treatment, and the one directly curative of the disease in the membrane proper, is to stimulate the parts to a better performance of their normal function, viz., the secretion of mucus.

Gottstein<sup>1</sup> advocates the use of the cotton tampon, for the promotion of secretion and the correction of fetor, in atrophic rhinitis. His plan consists in packing pellets of cotton between the turbinated bones and the septum, and allowing them to remain twenty-four hours. His paper has been the subject of much comment, and has excited no little interest since its publication. The plan is a novel one, certainly, but it seems a somewhat cumbersome and roundabout way of accomplishing a very simple purpose. It is, moreover, attended with no little discomfort, as it involves a plugged-up nose for the twenty-four hours. What is accomplished by Gottstein's plugs, is simply the stimulation of the membrane by the irritating presence of a foreign body. A flow of mucus is necessarily excited, and of course the fetor corrected, for the cause of the fetor in retained secretion no longer exists, as long as the profuse discharge of mucus continues. Gottstein's plan, therefore, is rational in its action, but we can accomplish the same end by means much more simple, more thorough, and with much less discomfort to the patient. It is alluded to here mainly on account of its originality, and from the fact that it recognizes the main indication for treatment, in stimulating the membrane. Beverley Robinson<sup>2</sup> indorses their utility, while Woakes makes use only of Gottstein's tampons for the purpose of applying powders to the diseased membrane, thus securing the local action of his medicament to-

<sup>1</sup> Berliner Klinische Wochenschrift, No. 4, 1881.

<sup>2</sup> Op. cit.



gether with such benefit as may result from the plugging process. Both Sajous and Mackenzie<sup>1</sup> advise the use of the galvano-cautery at white heat, as first recommended by Fränkel. Lennox Browne<sup>2</sup> considers this decidedly the best treatment, and follows the application of the cautery with insufflations of iodoform or iodol, claiming thereby to relieve both the ozæna and the aural symptoms. Woakes<sup>3</sup> recommends the application of iodoform in ether, in the form of spray. Cohen<sup>4</sup> recommends the vapor of ammonium chloride, administered by means of Lewin's apparatus.

As regards the use of the galvano-cautery, it seems to me this measure should be resorted to with the greatest caution, as it is an agent capable of doing much mischief. The essential feature of the disease is loss of tissue, a condition which might be enhanced by so powerful a destructive agent. As a stimulating measure, however, I can see how, with care, it might be attended with good results, especially in the earlier stage of the disease. Thus, Abeille<sup>5</sup> reports a case in which a boy aged fifteen was radically cured by this agent, by a course of treatment lasting fifteen months. Iodol and iodoform I have never regarded as agents of much power, other than as disinfectants, although Seifert<sup>6</sup> recommends the insufflation of iodol, after the cavity has been tamponed for one or two hours according to Gottstein's method. One curious method of treatment may be noted, that of Baratoux and Debousquet-Laborderie<sup>7</sup> who transplanted minute portions of frog-skin to eroded surfaces on the mucous membrane, resulting from atrophic rhinitis, claiming successful results from the procedure. In the same category we might note the suggestion of Harrison Allen<sup>8</sup> who recommends denudation of the middle turbinated bone by means of the finger passed into the nasal cavity, the patient being under an anæsthetic.

Noquet,<sup>9</sup> of Lille, claims excellent results from the following course of treatment. The patient is to use daily a douche of one litre of tepid water, in which a tablespoonful of chlorate of potash has been dissolved. After this has been used for eight days, a solution of carbolic acid, gr. ij. to the litre, is substituted. After each douche, the patient is to use the following as a tepid spray:

R	Chloral hydrat.,	.	.	.	.	.	.	.50
	Acidi borici,	.	.	.	.	.	.	6.
	Glycerini puri,	.	.	.	.	.	.	10.
	Aq. lauro-cerasi dest.,	.	.	.	.	.	.	20.
	Aq. dest.,	.	.	.	.	.	.	200.
M.								

<sup>1</sup> Op. cit.<sup>2</sup> Op. cit., p. 528.<sup>3</sup> *Courier Medical*, No. 51, p. 488.<sup>4</sup> *Munch. Med. Woch.*, No. 4, 1887.<sup>5</sup> *Progrès Médicale*, April 9th, 1887.<sup>6</sup> *Internat. J. of Med. Sci.*, April, 1886.<sup>7</sup> *Rev. Mens. de Laryngol.*, May, 1887.

In the middle of the day, the patient is to use a spray of "Vinaigre Antiseptique" in the proportion of a coffee-spoonful to seven ounces of water. Three times a week the surgeon is to use, as a spray to the anterior and posterior nares, and also as an application by means of a cotton pledget, a twenty-per-cent solution of chloride of zinc, to which enough hydrochloric acid has been added to form a clear solution. If any points remain red and a little hypertrophied, they are to be touched by the galvano-cautery. The author claims excellent results from the above method, and says that there seems to be an actual regeneration of the mucous membrane in a certain number of cases. He adds, however, that in the most advanced cases no such regeneration can be expected.

Following a previous suggestion of Shurley,<sup>1</sup> as to the treatment of pharyngitis sicca by means of the galvanic current, Bryson Delavan,<sup>2</sup> of New York, recommends this treatment for a similar nasal condition. His method is as follows: The positive electrode is to be placed on the nape of the neck, while the negative is wrapped in absorbent cotton, and applied directly to the nasal mucous membrane. The strength of the current is from four to seven milliampères, the duration of the application being from seven to fifteen minutes, or until a moderate watery secretion is induced. Delavan secures excellent results from this plan of treatment, which seems exceedingly rational, and well worth a trial.

As regards any destructive measure, such as the cautery, or Allen's suggestion of denuding the middle turbinate, I can see no rational justification for such procedures. The use of iodoform, chloride of ammonium, or indeed of any local application, is attended with good results. But we possess no drugs which can claim any specific virtues in this affection, and our best results will be attained only by a careful attention to the thorough cleansing of the parts, and the subsequent endeavor to keep them, as far as possible, constantly moistened, in order to prevent the drying of the membrane, for as long as the membrane is kept moist, even if with nothing more than clear water, crust formation, and its resultant fetor, cannot occur.

The primary cleansing of the parts must be done at first by the physician, in the manner already suggested. At the commencement of treatment, it will be necessary to see the patient daily, or perhaps three times each week. After the disease has been brought somewhat under control, the intervals of attendance at the office may be lengthened as may seem best. At the same time the patient should be directed to provide himself with an atomizer, preferably

<sup>1</sup> Trans. of the American Laryngological Association, 1880, p. 20.

<sup>2</sup> Trans. Amer. Laryngological Assn., 1887, p. 145.

the Burgess, shown in Fig. 47, in which there may be used any simple alkaline or disinfectant lotion, such as the Dobell's solution already given. This is to be thoroughly applied to each passage five or six times daily if necessary. The patient being instructed as to the character of his disease, and the indications for treatment, will easily appreciate the object of the spray, viz., to prevent crust formation, and will make the applications as they may be needed.

An exceedingly convenient cleansing lotion, and one which I frequently use, has been suggested by Seiler,<sup>1</sup> composed of several of the salts of soda in combination with thymol, eucalyptol, menthol, etc. It is made into the form of a tablet, and sold in the drug stores as Seiler's Antiseptic Tablets. One tablet being dissolved in two ounces of water forms a solution of the proper strength.

In addition to the frequent use of the spray, the patient should be directed to use once each day, by means of the nasal douche (Fig. 36), from one to two quarts of hot water, in each quart of which a tablespoonful of salt has been dissolved. This should be used as hot as can be tolerated. The beneficial effect of this is especially noticeable at the commencement of the treatment, in altering the character of the discharge, rendering it less purulent, and thus controlling crust formation. It acts probably both in controlling cell proliferation and giving tone to the walls of the venous sinuses, as well as a cleansing wash.

In addition to the above plan I have occasionally found some benefit from the use of local applications, in the form of snuff, of certain drugs whose action is to stimulate the membrane to a freer secretion. Among them we mention, in the order of preference.

Pulv. galangæ,	. . . . .	gr. xx. in 3 i.
Pulv. sanguinariæ,	. . . . .	gr. xv. " 3 i.
Pulv. belladonnæ,	. . . . .	gr. vi. " 3 i.
Acidi salicylic.,	. . . . .	gr. v. " 3 i.
Sodii salicylatis,	. . . . .	gr. viij. " 3 i.
Sodii bicarb.,	. . . . .	gr. xv. " 3 i.
Potass. bromidi,	. . . . .	gr. xx. " 3 i.

These drugs may be incorporated in any convenient vehicle, in the strength given above, such as starch, calcined magnesia, lycopodium, sugar of milk, etc. A box of the snuff being carried in the pocket, a small amount of it can be insufflated three or four times daily.

As before stated, the general health of patients suffering from atrophic rhinitis is not usually affected, and hence there are no indications for internal medication. These patients, however, as well

<sup>1</sup> N. Y. Med. Record, Feb. 18th, 1888.

as all who suffer from catarrhal disorders, are peculiarly susceptible to changes in the weather, etc., and hence their habits of life, general hygienic surroundings, clothing, bathing, etc., should receive full attention at the hands of the physician. The general rules which govern our advice on these matters have already been given in sufficient detail in a previous chapter and hence need not be repeated here.



## CHAPTER XII.

### CROUPOUS RHINITIS.

CROUPOUS rhinitis is an acute inflammation of the mucous membrane lining the nasal passages. It occurs both in children and adults, although in children it runs a somewhat more protracted course, and its symptoms show a more aggravated character. It is characterized by a deposit of fibrinous exudation, constituting a false membrane, which presents the characteristic anatomical features of a croupous membrane, viz., one which is superimposed upon the epithelial layer, and does not involve the deeper tissues. It has already been stated, in the chapter on mucous membranes, that a fibrinous exudation is mainly to be regarded as a local manifestation of a general blood-condition, a local exudation involving no serious danger to life, except from the somewhat adventitious choice which it exercises of certain localities, as for instance, when deposited in the larynx, it involves great danger of death from suffocation.

This disease is of somewhat frequent occurrence, and yet is mentioned but rarely in current literature. Fränkel<sup>1</sup> refers somewhat casually to it, as a complication of diphtheritic disease of the nose, while Schuller<sup>2</sup> gives a somewhat more accurate description of it, in reporting a case of what was probably a case of croupous disease of the nose, but still appends the name diphtheritic. Cohen<sup>3</sup> refers to a fibrinous exudation, as a somewhat rare occurrence in acute coryza. Cohen undoubtedly recognized the disease as distinct from diphtheria, but, with this exception, we find most writers, up to within the past two years, entertaining exceedingly vague ideas as to the distinctive character of the two affections. Among the earliest to recognize it was Moldenhauer<sup>4</sup> who has given us a very accurate description of its course and symptoms; while Hartmann,<sup>5</sup> of Berlin, has reported six cases, and Seifert,<sup>6</sup> G. R. Ryer-

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<sup>1</sup> "Ziemssen's Encyclop.," Amer. ed., vol. iv., p. 136.

<sup>2</sup> *Jahrbuch für Kinderheilkunde*, N. F., iv. Jahrg. 1871, p. 331.

<sup>3</sup> "Diseases of the Throat and Nose," 2d. ed., p. 332.

<sup>4</sup> *Monatsschrift für Ohrenheilkunde*, No. 9, 1887.

<sup>5</sup> *Deutsch. Med. Wochenschrift*, 1887, No. 29, s. 641.

<sup>6</sup> *Münchener Med. Wochenschr.*, 1887, No. 38.

son,<sup>1</sup> Gluck,<sup>2</sup> Bresgen,<sup>3</sup> and Potter,<sup>4</sup> have also reported cases of the disease which had been under observation.

ETIOLOGY.—The cause of the disease is to be sought for in the same source in which we find the causation of an acute fibrinous exudation in any other portion of the upper air-passages, viz., in a germ floating in the atmosphere, which lodges upon the surface of the mucous membrane, where it excites a specific form of inflammation. This germ, lodging upon the mucous membrane, becomes embodied, as it were, in the meshes of its epithelial layer, in a manner which we are unable to describe; it may be determined by the existence of an erosion at the point of lodgment, or it may lodge upon an intact surface. As a matter of clinical observation, the most frequent site upon which a croupous exudation is met with, is on the surface of the faucial tonsil, taking the form either of a croupous exudation, or an ordinary follicular tonsillitis. Why this should be the case it is easy to understand, for the ragged spongy surface of the tonsil forms almost a trap, as it were, for the entanglement of disease-germs. In the nasal mucous membrane, on the other hand, we find a field where the large quantity of out-poured serum cleanses the tissue; a state of activity constantly kept up by the ceaseless waving of the nasal ciliæ; and finally a constant to-and-fro current of air, all going to make up a condition strikingly unfavorable to the lodgment of a disease-germ. Hence, we find croupous exudation of the nose an exceedingly rare affection. The source of the germ, we may say, is in the sewer-pipes, or other recognized sources of infection. Aside from this, we hazard no further suggestion. What the germ is, the pathological laboratory has not yet told us. That it is a germ, however, I am convinced, basing this view largely on clinical observation.

In a discussion on croupous rhinitis, at the sixtieth meeting of the German Naturalists and Physicians, September 21st, 1887, Bresgen asserted, as the result of observation, that many cases followed the application of the galvano-cautery to the nose, the wound becoming covered with a false membrane; while Hering suggested the insufflation of impure water as a cause of the disease, and consequently forbids this, after operations. Schmithinsen, coinciding with Hering's views, reported twelve cases, in some of which there was a history of hereditary syphilis. This suggestion of syphilis, I think, may be dismissed, in connection with the disease, as an acute fibrinous exudation is probably never a manifestation of hereditary

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<sup>1</sup> New York Med. Record, July 30th, 1887.

<sup>2</sup> Med. Record, April 27th, 1889, vol. xxxv., p. 461.

<sup>3</sup> Deutsch. Med. Wochenschr., 1888, No. 4.

<sup>4</sup> Journal of Laryngology, March, 1889.

syphilis. A very frequent source of the disease, undoubtedly, is to be found in operations in the nose, not only after the galvano-cautery, as suggested by Bresgen and Hering, but also and more notably, after any operation which involves a section of the membrane. A croupous membrane forms on the cut surface in these cases, without manifesting any tendency to extend, and while the local symptoms are not so marked, the febrile symptoms are often quite as acute as those in an idiopathic case of the disease.

**PATHOLOGY.**—The essential pathological lesions observed in the mucous membrane proper, are those of an ordinary acute rhinitis, and consist briefly of a hyperæmia of the blood-vessels, both of the turbinated tissue and of the mucosa proper, together with the general increase of the nutritive processes met with in that disease, viz., increased exudation of serum, and cell-proliferation. On the surface of the membrane, and somewhat closely adherent to it, is found a false membrane, presenting the following characteristics: there is a basement substance of fibrillæ of fibrin, and considerable granular fibrin; entangled in this basement substance, we find numerous white blood-cells and epithelial cells, undergoing granular degeneration and coagulation necrosis. Some red blood-cells are often to be observed. The exudation presents then under the microscope the ordinary characteristic appearances of a croupous membrane. Exudation occurs on the faces of the lower and middle turbinated bones, and in aggravated cases, on the septum in the anterior portion of the nares. I have never noticed any tendency to extension to the accessory sinuses, although their orifices are closed by the swollen nasal membrane, and distressing symptoms referable to those cavities may occur thereby.

**SYMPTOMATOLOGY.**—The disease is generally ushered in by chilly sensations, and more rarely by a well-marked chill. This is followed by general febrile motion, characterized by headache, pains in the bones, and loss of appetite. Coincident with these, symptoms of acute rhinitis set in, characterized by swelling of the nasal membrane, stenosis, watery discharge, and sneezing. The dry stage here is omitted, and there immediately sets in a sero-mucous discharge from the nose, which soon becomes somewhat purulent in character. The amount of the discharge is rather excessive throughout the whole course of the disease, but never assumes a fetid character or gives rise to any offensive odor.

At the onset of the disease, the thermometer will often show a temperature of  $101^{\circ}$  to  $103^{\circ}$ , which lasting one or two days, subsides somewhat, and the further progress of the attack is accompanied by a temperature of  $100^{\circ}$  to  $101^{\circ}$ : although in adults, the tempera-



ture may become normal after the second or third day. The whole course of the attack is characterized by a feeling of illness and depression, with loss of appetite, indisposition to exertion, and the whole train of symptoms which we embrace under the general term *malaise*, although the patient is rarely confined to the bed, and not necessarily to the house. The local symptoms referable to the nose are oftentimes of a very distressing character. There is usually complete stenosis, with loss of the sense of smell, together with frontal headache, and oftentimes severe neuralgic pain along the course of the nasal nerve. The disease usually extends to the glands in the vault of the pharynx, and occasionally to the faucial tonsil. In these regions, however, we usually find a simple follicular tonsillitis, the croupous exudation confining itself to the crypts of the follicles, although Moldenhauer<sup>1</sup> has seen a true fibrinous membrane on the faucial tonsil.

**DIAGNOSIS.**—An examination of the case will not always reveal the presence of the membrane at first, but if care be exercised, and the secretions removed from the passages, the characteristic pearly-white membrane will be seen covering the nasal lining, and extending down very closely to the muco-cutaneous junction. If now a careful examination is made of the false membrane, it will be found that it is easily detached from the mucous membrane beneath it without causing hemorrhage. This, I think, constitutes the pathognomonic symptom of a croupous exudation in this region, as distinguished from a diphtheritic. In some cases, the membrane does not extend near to the margin of the nostril, and the nasal cavity is obscured by the swelling of the turbinated tissues, and the excessive amount of secretion; and, furthermore, cocaine is of little avail in shrinking up the membrane, and opening the cavity to inspection. In such cases, the diagnosis can only be made, by gently wiping out the cavity with a pledget of cotton on the probe, and endeavoring to detach a portion of the false membrane, whose presence should be suspected in every case of apparent acute rhinitis, in which the constitutional symptoms seem excessive, and the local symptoms of so aggravated a character.

In adults, the false membrane is small, thin and easily recognized as a croupous exudation, and furthermore is not attended with excessive muco-purulent secretion. In children, however, we see the notable tendency, already alluded to, to active cell-proliferation, which distinguishes morbid processes in the mucous membranes in early years, hence we find in them the exudate often forming a soft, thick, almost granular mass, very friable, which in

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<sup>1</sup> *Loc. cit.*



some cases can almost be wiped from the mucous membrane in small fragments.

PROGNOSIS.—The prognosis is favorable, in that the disease confines itself mainly to the nasal cavity, and never, as far as I know, shows a tendency to the development of a similar process in the larynx. The membrane forms more or less rapidly, and being exfoliated in small shreds, or in patches, renews itself; a fresh crop developing in from five to eight days, this exfoliation occasionally being attended with moderate epistaxis.

The disease runs its course in adults in from eight to fourteen days, while in children it usually lasts from three to five weeks. Hartmann<sup>1</sup> gives the course of the disease as from eight to fourteen days, his experience evidently having been confined to cases in adult life, while Bresgen<sup>2</sup> assigns a course of several weeks.

GENERAL TREATMENT.—The disease is essentially a constitutional affection, attended with prominent local symptoms. What the blood-condition is, we have no means of determining, but it is probably, in the main, that condition of hyperinosis which is present in croupous laryngitis, tonsillitis, and all diseases characterized by fibrinous exudation. I believe there is no agent possessing the property of controlling this blood-condition in a higher degree than tincture of iron, which should be administered in full doses, as soon as the disease is recognized. This remedy may be given combined with glycerin as follows:

R Tinct. ferri chloridi, . . . . . 3 ij.

Glycerini, . . . . . ad ʒ ij.

M. S. Half a teaspoonful to be given every four hours.

In connection with the iron, there should be given some preparation of quinine or cinchona, for its general tonic effect. In young children, in whom the pseudo-membranous formation assumes a rapid and efflorescent type, I believe the efficacy of mercurial treatment should be thoroughly tested in the early stage of the attack. Preference should be given to the use of the mild chloride, which may be administered in full doses, frequently repeated. To a child of six years of age, there may be given the following:

R Hydrarg. chloridi mitis, . . . . . grs. xx.

Sacch. lactis, . . . . . 3 ij.

M. div. in cht. No. xx. S. One powder to be given every four hours.

If, at the end of the second day, decided amelioration of the local symptoms is not noticed, the iron treatment had best be substituted. If fever is present, it should be managed on the same

<sup>1</sup> Loc. cit.

<sup>2</sup> Loc. cit.

general principles which govern our administration of remedies in other febrile conditions in childhood. The same, of course, may be said in regard to the necessity of laxatives, etc.

LOCAL TREATMENT.—Our first effort should be directed toward the removal of the membrane. This is to be accomplished with such care and delicacy as will accomplish the purpose without injury to the soft parts beneath, or better still, if free access can be obtained to the pseudo-membrane, it should be destroyed in situ, its capacity for mischief being ablated, and the inert film left in place, to prevent a new growth. This also, I think, should be accomplished by means of one of the iron preparations. The mucopurulent discharge being carefully removed, and the surface of the false membrane cleansed as thoroughly as possible by means of a cotton-pledget, it should be thoroughly but delicately coated with either the tincture of iron, or the persulphate in officinal strength. This process should be repeated at least once, and if practicable, twice daily. The use of cleansing washes by means of an atomizer is grateful to the patient, if feasible, but in young children the stenosis is so complete as to render their availability somewhat limited.

Moldenhauer<sup>1</sup> recommends the use of warm inhalations, while Hartmann<sup>1</sup> and Bresgen<sup>1</sup> both recommend the use of iodoform after the removal of the membrane, either as an insufflation, or in suspension in glycerine. Cocaine, as before stated, has but a limited action in controlling the stenosis. If the part can be sufficiently cleansed, however, to admit of the application of cocaine, a four-per-cent solution should always be resorted to, and frequently repeated, both as controlling the blood-supply, and relieving nasal stenosis.

The indications for treatment being so clear, we need not confine ourselves to the use of any one remedy, or any one line of procedure, but resorting to those which our experience has taught us are efficient in modifying the systemic condition, or in limiting the activity of the membrane-formation, their efficacy will always be early recognized, and, pursuing such measures as we observe to control the two prominent features of the disease, I think, as a rule, we may feel confident of oftentimes aborting, and certainly, in most cases, mitigating the severity, and curtailing the duration of the attack.

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<sup>1</sup> Loc. cit.

## CHAPTER XIII.

### NASAL REFLEXES.

THE question of nasal reflexes, is one which possesses many points of exceeding great interest, not only on account of its curious development of symptoms, but also from the exceedingly broad field which it embraces, as the result of our increased knowledge of intra-nasal disease, and the great activity which has characterized their study from a clinical point of view. To Marshall Hall is probably due the credit of first making clear to us the phenomena of reflex actions, although at the same time Johann Mueller<sup>1</sup> was pursuing a similar line of investigation, which was published the same year. It should be stated, however, that many of the earlier physiologists had already recorded these phenomena with a considerable degree of accuracy of observation. Notably Whytt,<sup>2</sup> Procheska,<sup>3</sup> and Cullen,<sup>4</sup> who recognized the reflex character of certain of the ordinary phenomena of daily life, as the act of sneezing, coughing, vomiting, etc.

As recognized by all physiologists at the present day, in order that we may have a true reflex phenomenon, we must have, (1) a sensitive nerve fibre, connected with (2) a central nervous cell or mechanism, which in its turn is connected with (3) a motor fibre, supplying some motor organ. I think the first physiologists to bring out clearly these three parts of the reflex arc were Johann Mueller in the first edition of his work, and Marshall Hall;<sup>5</sup> although Le Galois<sup>6</sup> cites the difference between the muscular irritability in the amputated thigh of a frog, and the movements which can be excited by stimulating the integument of a decapitated frog, thus clearly recognizing the necessity of a ganglionic centre. Sub-

<sup>1</sup> "Elements of Physiology," by Johann Mueller, translated from the second German edition by William Baly, Philadelphia, 1843.

<sup>2</sup> "Vital and other Involuntary Motions of Animals," Edinburgh, 1751. (Works, pp. 153, 162, 506, and 511.)

<sup>3</sup> "Annotat. Academiciae," 1784. "Opera Minora," 1800. "Lehrsätze aus der Physiologie," Vienna, 1797.

<sup>4</sup> Works, Edinburgh, 1827, vol. i., pp. 105 and 109.

<sup>5</sup> Philosophical Transactions, 1833.

<sup>6</sup> "Experiments on the Principles of Life:" translation by N. C. & J. G. Nancrede, Philadelphia, 1813, p. 36.

sequently, Marshall Hall<sup>1</sup> makes a very clear statement of the reflex apparatus as follows: "these actions are excited and ultimately accomplished through the medium of appropriate incident and reflex nerves and their communicating medium, the spinal marrow. If any part be interrupted, the phenomenon ceases instantly." The term reflex, as defined by Flint,<sup>2</sup> can be applied to any generation of nerve force, which occurs as a consequence of an impression received by a nerve-centre; and reflex phenomena are by no means confined to the action of the spinal cord. The movements of the iris are reflex, and yet they take place in many instances without the intervention of the cord. The movements of respiration are reflex, and these are presided over by the medulla oblongata. Movements of the intestines and the involuntary muscles generally are reflex, and they involve the action of the sympathetic system of nerves.

Applying this to the generation of reflex diseases, we find that a local morbid condition of one portion of the body creates an impression, which is conveyed to a nerve-centre, from which there is transmitted to an entirely different locality in the economy a certain force, by which there is generated in that locality, either a pathological lesion, or a train of morbid symptoms. Probably in no one of the great systems of the body do we find this reflex tendency, as we may call it, so active as in the respiratory apparatus. Mueller<sup>3</sup> goes still further, and makes the general assertion that the irritation of any mucous membrane of the body is the most frequent cause of reflex manifestations in the respiratory system, while irritation of the cutaneous system is most likely to give rise to general convulsions. As we have already claimed in our study of the physiology of the nose, its mucous lining contains the most intricate, and the most delicately sensitive nervous organization of any portion of the respiratory tract. We should naturally then expect it to be a very frequent source of reflex phenomena. Thus Brown-Séquard as cited by Ruault<sup>4</sup> observed that by plunging the nose into cold water, respiration and cardiac action would be stopped, while Kratschmer and Francois-Franck, as cited by the same author, show that thermic, mechanical or chemical irritation of the nasal fossæ, can reflexly produce a drawing up of the nares, arrest of respiration in expiration, momentary arrest of the heart, and slackening of the pulse. All these actions are produced through the medium of the trigeminus. Gourewitscha and Luchsinger have

<sup>1</sup> "Memoirs of the Nervous System," London, 1837.

<sup>2</sup> "Text-book of Human Physiology," New York, 1876, p. 683.

<sup>3</sup> Op. cit., p. 552.

<sup>4</sup> Gaz. des Hôpitaux, December 10th, 1887.



observed the same phenomena by acting on the olfactory nerves. Probably the first writer to call attention to the nasal reflex was Voltolini<sup>1</sup> who reported a case of spasmodic asthma, dependent on the existence of nasal polypi, which was cured by the removal of the growths. This observation has been verified by so large a number of writers, that it seems to me the connection between the two diseases cannot well be questioned, although Lennox Browne and Boecker of Berlin state that, in many instances, the asthmatic symptom persists, even after the removal of the polypi. This question, however, is more fully discussed in the chapter on asthma.

The possibility of there being other reflexes due to intra-nasal disease seems not to have been opened up, until Seiler<sup>2</sup> published two cases of reflex cough, due to a hypertrophic rhinitis; followed by Hack<sup>3</sup> who observed a case of spasmodic cough due to a fibrous polypus. A similar observation was made by John Mackenzie.<sup>4</sup>

Some years previously, however, Richet<sup>5</sup> had reported a case of convulsive tic douloureux, which was cured by the removal of an enchondroma of the nasal septum.

The general interest of medical men in this subject of nasal reflexes, was probably first excited, when Hack<sup>6</sup> published the series of papers, which was subsequently enlarged into his well-known monograph. He reports a large number of nasal reflexes covering a very wide field, as follows: gastralgia and dyspepsias; cardiac palpitation; tumefaction and redness, either temporary or permanent, of the skin of the nose; transitory and circumscribed œdemas; salivation; neuralgia of the first two branches of the trigeminus; cephalalgia; migraine; scotoma; ciliary neuralgia; photophobia; vertigo; agoraphobia; and exophthalmic goitre.

These affections Hack found were due to various forms of intra-nasal diseases, although the large majority were dependent upon hypertrophy, or chronic hyperæmia of the nasal membrane. Hack makes the further statement, that simple hyperæmia without hypertrophy is more frequently a source of nasal reflex than a true hypertrophy with tissue change. Going still further, he makes the assertion that sneezing, watery discharge with stenosis alternating from one side to the other constitute conditions which indicate, almost pathognomonically, that the turbinated bodies are the source of reflex phenomena, if such exist. This latter statement is undoubtedly true, for these symptoms indicate not an ordinary

<sup>1</sup> "Die Anwendung der Galvano-kaustik," Vienna, 1872.

<sup>2</sup> Arch. of Laryngology, vol. iii., No. 3, p. 240.

<sup>3</sup> Berlin. Klinische Wochenschrift, 1882, No. 25.

<sup>4</sup> Amer. Journal of Medical Sciences, July, 1883.

<sup>5</sup> Cited by Casabianca, Thèse de Paris, 1877.

<sup>6</sup> Wien. Med. Wochenschrift, 1882-3.

catarrhal inflammation, but a vaso-motor paresis of the blood-vessels of the nasal mucous membrane, the essential condition which exists in hay-fever. This disease is only met with in highly neurotic individuals, and the neurotic habit, I take it, is the most active predisposing cause of a nasal reflex.

A rather interesting symptom has been observed by Max Schäffer,<sup>1</sup> of Bremen, who reports a case of complete loss of voice, with no observable lesion of the larynx, in a case of hypertrophic rhinitis. Local faradization proving useless, the cure was effected by treatment directed to the nasal hypertrophy. Elsberg<sup>2</sup> reports a case of chorea, which he had seen in 1863, as occurring as a reflex phenomenon due to hypertrophic rhinitis. Similar observations have been made by J. L. Sallinger<sup>3</sup> and also by the author.<sup>4</sup> Cases of epilepsy, due to intra-nasal disease, have been reported by Sallinger,<sup>5</sup> Fincke,<sup>6</sup> and also by the author,<sup>7</sup> while a case of psychical epilepsy has been reported by T. A. McBride.<sup>8</sup> Ziem<sup>9</sup> reports, among other reflex symptoms, a case of nocturnal enuresis. Dr. North,<sup>10</sup> in adding neurasthenia to the list of nasal reflexes, goes so far as to state that he has yet to see a case of neurasthenia, in which there is not some catarrhal trouble. Guye,<sup>11</sup> of Amsterdam, describes, under the term aprosexia, a mental condition, under the influence of which the individual is unable to concentrate the mind on any one subject, and reports a case of a boy, three years of age, suffering from adenoid disease of the vault of the pharynx, who could not learn the first three letters of the alphabet, after an entire year at school. After the removal of the growths, the whole alphabet was mastered in one week.

Salivation would seem a rather curious reflex disturbance, as a result of intra-nasal disease, and yet two such cases have come under my own observation, in elderly people, in whom this symptom, although not present in an aggravated form, became a source of very great distress both physically and mentally, for in each of these cases, a very prominent subjective symptom was the notable depression of spirits. The flow of saliva, though small, gave rise to the necessity of an almost uninterrupted expectoration, which was

<sup>1</sup> *Monatsschrift für Ohrenheilkunde*, No. 11, 1886.

<sup>2</sup> *Trans. Amer. Laryngological Association*, 1883.

<sup>3</sup> *Polyclinic*, Philadelphia, June, 1887.

<sup>4</sup> "Deformities of the Nasal Septum," *N. Y. Med. Record*, Jan., 1887.

<sup>5</sup> *Loc. cit.*

<sup>6</sup> *Moniteur de la Polyclinique*, June 7th, 1885.

<sup>7</sup> *Loc. cit.*

<sup>8</sup> *N. Y. Med. Record*, vol. xxix., p. 137.

<sup>9</sup> *Monatsschrift für Ohrenheilkunde*, Nos. 8 and 9, 1886.

<sup>10</sup> *Medical Register*, Philadelphia, May 14th, 1887.

<sup>11</sup> Sixtieth meeting of German Naturalists and Physicians, Subsection of Otology, September 20th, 1887.

a source of annoyance, not only to themselves, but to those about them. In both these cases, the result of treatment was quite successful. A similar case has been reported by E. Fränkel, as cited by Ruault.<sup>1</sup>

The question of ocular disturbances dependent on intra-nasal disease seems to have excited the attention of American observers more notably than foreign, although Hack mentions weak, watery eyes in his list of affections. In an able paper by Dr. Gruening,<sup>2</sup> of New York, read before the Academy of Medicine a number of cases of photophobia with mild conjunctivitis, were reported as cured by treatment for intranasal disease. Similar observations have been made by Beverley Robinson.<sup>3</sup> Cheatham,<sup>4</sup> also holds that many cases of asthenopia are due to intranasal disease. B. Bettman,<sup>5</sup> of Chicago, reports six cases of epiphora, conjunctivitis, photophobia and pain above the eyes, due to nasal disease, and which were cured by galvano-caustic applications to the inferior turbinated bones. Lennox Browne,<sup>6</sup> reports a case of glaucoma, not benefited by iridectomy, but cured by the eradication of a nasal polyp. Hack and Schäffer mention *muscæ volitantes* also, occurring as reflex nasal symptom. Moldenhauer<sup>7</sup> makes the rather curious statement, that rheumatic muscular pains not infrequently occur in connection with nasal disorders, but fails to substantiate the observation by the report of cases.

If we attempt to explain these various reflexes we find ourselves compelled to adopt rather vague and indefinite theories, which are quite as obscure as the reflexes themselves. Thus, Hack's theory is, that from a number of causes, some within the nasal cavities, some from without, there is developed reflexly, a tumefaction of the mucous membrane covering the anterior portion of the lower turbinated bone on one or both sides, so that from slight nervous irritation, a so-called secondary reflex will be developed in remote parts of the body. Moldenhauer<sup>8</sup> controverts this theory of Hack's, on the ground that both nasal polypus and polypoid thickening, as well as atrophic rhinitis, are a source of reflex phenomena, in neither of which does hyperæmia exist. This statement of Moldenhauer is scarcely tenable, for in polypi and polypoid thickening, we have morbid conditions exceedingly favorable for the development of

<sup>1</sup> Loc. cit.

<sup>2</sup> N. Y. Medical Record, January 30th, 1886, p. 122.

<sup>3</sup> Medical Record, April 3d, 1886, p. 397.

<sup>4</sup> American Practitioner and News, Louisville, April 2d, 1887.

<sup>5</sup> Journal of the American Med. Association, May 7th, 1887.

<sup>6</sup> "The Throat and its Diseases," London, 1887, p. 507.

<sup>7</sup> "Die Krankheiten der Nasenhöhlen," etc., Leipzig, 1886, p. 176.

<sup>8</sup> Op. cit., p. 176.



reflexes. Atrophic rhinitis, however, is a condition which in my experience is rarely the source of a reflex disturbance, although Ruault<sup>1</sup> makes the statement that the crust-accumulation in this disease may become the exciting cause of reflex phenomena. John Mackenzie<sup>2</sup> claims to have discovered certain sensitive areas in the nose, which are peculiarly connected with the evolution of the reflex act. These areas are "limited to the mucous membrane covering the middle and inferior turbinated bodies, and posterior half of the septum." This conclusion was based on a series of experiments, which demonstrated that reflex action was produced by stimulation of these particular localities only. It will be noticed that Mackenzie's areas embrace simply that portion of the nasal mucous membrane wherein we have the turbinated bodies, which, owing to their intense and constant activity, as an important part of the respiratory apparatus, must necessarily be exquisitely sensitive, far more so than other portions of the nasal chambers. Mackenzie's theory of sensitive areas in the nose is virtually, then, an assertion that the area of reflex action is the respiratory tract, if by respiratory tract we understand that portion in which we find the large venous plexuses, which constitute the turbinated bodies.

E. J. Moure<sup>3</sup> adopts the theory that nervous reflexes arise simply from mechanical irritation in the nasal chambers, basing this view on the experiments of Schiff and Bert, who have shown that any mechanical, chemical or thermal irritation in the mucous membrane of the nose, can reflexly affect respiration. I think it will be noticed that all these theories fail to explain why a reflex occurs, but rather seem to exhibit the morbid conditions in the nose, which are liable to be the source of a reflex manifestation. That the condition in the nose which more frequently causes reflex action, is hyperæmia rather than hypertrophy, as stated by Hack, I think is fully borne out by clinical observation. Moreover this is easily explained by the fact, that hyperæmia generally occurs in patients of a decidedly neurotic temperament, for extreme congestion of the blood-vessels only occurs, as a rule, as the result of vaso-motor paralysis or paresis, whereas simple hypertrophic changes occur purely as a local disease. That the neurotic temperament is a prominent predisposing cause of a nasal reflex, I think none will question. The assertion of Moldenhauer and Ruault, that reflexes occur in an atrophic rhinitis, is hardly borne out by clinical observation. John Mackenzie,<sup>4</sup> also recognized this in his statement that "where complete atrophy of the turbinated structures existed, as for example in ozæna, reflex action was not present, nor could it be

<sup>1</sup> Loc. cit.<sup>2</sup> Amer. Journal of Med. Sciences, July, 1883.<sup>3</sup> "Manuel pratique des maladies des fosses nasales," etc., p. 250.<sup>4</sup> Loc. cit.



induced by artificial stimulation." That reflexes, however, never occur in connection with atrophic rhinitis, cannot be asserted when we consider that such a careful observer as B. Fränkel has reported cases of facial neuralgia and vertigo occurring as nasal reflexes in atrophic rhinitis, while Schmaltz also reports similar cases. Finne<sup>1</sup> also cites a case of neuralgia of the fifth nerve, of three months' duration, in an anæmic woman of fifty, which was dependent on atrophic rhinitis. The reflex in these cases is probably due to impaired general nutrition, from the fact that these patients constantly live in a polluted atmosphere, every breath of air which is taken into the nostrils passing over putrid masses of decaying animal matter in the nose. Furthermore, some of these neuralgias can be explained in the same manner in which we explain the frontal headache which occurs in acute coryza, either from occlusion of the orifice, or congestion of the lining membrane of some of the accessory sinuses, producing nerve-pressure. To these cases, the term reflex does not properly apply, and yet we generally class them under this head. If we glance now at the various diseases which occur, we find that they divide themselves into neuralgias, spasmodic or paralytic nervous affections, and ocular symptoms; the neuralgias, embracing migraine and cephalalgia, I think may be explained as far as we can explain them, by the general principle, that they only occur in patients suffering from impaired general nutrition. Any patient, I take it, suffering from an obstructive lesion in the upper air passages, by which the respiratory function is in any degree hampered, thereby feels, to a certain extent, the systemic effect of the resultant impairment of the process of oxidization.

In the large majority of cases, spasm of the glottis is a direct symptom, rather than a reflex from intra-nasal disease. In the former case, its development can be explained on the basis of a catarrhal laryngitis, developing as it so frequently does, as the sequela of a chronic rhinitis. Where it occurs as a reflex, the method of development probably is much the same as an asthmatic attack. Owing to the intimate connection between the two regions, as parts of the respiratory apparatus, any vaso-motor disturbance in the nasal mucous membrane is liable to give rise to disturbances in other portions of the passages. In the same manner, we may explain the occurrence of spasmodic contraction of the faucial or palatal muscles, which has been recorded by Seifert,<sup>2</sup> who reports a case of chronic contraction of the muscles of the face, soft palate and Eustachian tube, with objective and subjective gurgling sounds

<sup>1</sup> Norsk Magazin for Laegevidenskaben, June, 1887.

<sup>2</sup> International Klin. Rundschau, 1887, No. 29.

in the ear, due to a chronic rhinitis, although local treatment failed to afford any relief; while Michel<sup>1</sup> has observed "chronic spasm of the Eustachian tube, with objective and subjective gurgling sounds in the ear" in a lady of forty years of age, relieved by removal of polypi with the cold snare.

Functional aphonia is always, I think, a pseudo-paresis of the adductor muscles of the larynx, and occurs, as a rule, in hysterical females. I have seen cases such as Schäffer<sup>2</sup> reports, in which the loss of voice was apparently a nasal reflex, and furthermore where apparently the success of nasal treatment justified this view, and yet the aphonia sooner or later recurred, as is the usual rule in hysterical affections of the larynx.

Chorea is one of the diseases which when dependent upon intranasal disease, gives most satisfactory results from treatment. I have seen a number of such cases, in which the choreic movements disappeared completely and permanently with the cure of the nasal disorder. I take it that these patients all suffer to an extent from impaired general nutrition, as the result of interference with the normal respiratory act, as is so frequently observed among young people with any obstructive lesion in the upper air passages. Dr. Jacobi<sup>3</sup> also has found chorea associated with chronic rhinitis, as well as with enlarged tonsils and other obstructive lesions of the air passages.

Sallinger<sup>4</sup> and Fincke<sup>4</sup> both report cases of epilepsy, cured by treating concurrent intranasal disease, while R. W. Richardson<sup>5</sup> reports a case of a lady thirty-four years old, cured of an epilepsy by the removal of a post-nasal fibroma. My experience has been less fortunate, for although, in three cases which have been under my treatment, great apparent improvement, and in one case an apparent cure followed the removal of obstructive nasal lesions, in all cases the disease returned. The marked improvement which occurred in these cases—in one of them the attacks remaining absent for four months—would seem to indicate that they were probably of reflex origin. In these cases, the epileptic habit probably had become so far fixed, that the seizures were not controlled by removing the contributing cause. In the same category, probably, might be included vertigo, which is perhaps a rather frequent reflex nasal symptom. Joal<sup>6</sup> attributes this to the irritation of the terminal fibres of the trigeminus, although it would seem more easily

<sup>1</sup> Journal of Laryngology, vol. i., p. 335.

<sup>2</sup> Loc. cit.

<sup>3</sup> New York Med. Record, January 30th, 1886.

<sup>4</sup> Loc. cit.

<sup>5</sup> Asclepiad, January, 1887.

<sup>6</sup> Memoir at French Congress of Laryngology, 1887; Journal of Laryngology, vol. i., p. 252.

accounted for in a disturbance of the circulation at the base of the brain, the two regions being so intimately connected through the anterior and posterior ethmoidal arteries and veins, and separated only by the thin cribriform plate. Moldenhauer<sup>1</sup> adopts this view in the consideration of reflex headaches of a congestive type, and headache and vertigo, probably, are somewhat intimately related.

Ocular reflexes present many points of clinical interest, and yet when we attempt to state the direct connection that exists, we find ourselves again treading on purely theoretical grounds. Gruening<sup>2</sup> was probably the first to call prominent attention to these reflexes, in reporting cases of conjunctivitis, photophobia, asthenopia, etc., all of which were relieved by treating a pathological condition of the nasal membrane. Cheatham<sup>3</sup> goes so far as to state that most cases of asthenopia are dependent upon nasal disease; while Beverley Robinson<sup>3</sup> cites one case, of what was apparently a simple conjunctivitis, which had resisted treatment, but on the application of the galvano-cautery to several sensitive areas in the nose, the ocular symptoms were relieved.

Bettman, contributing a similar series of cases, adds to the list by reporting one of epiphora, which was cured by nasal treatment. Browne's case of glaucoma has already been alluded to. The eye symptoms of acute rhinitis are generally explained, in the main, by continuity of tissue, although a sympathetic element is generally recognized. The occurrence of the non-inflammatory reflexes is to be accounted for probably in the same manner. Those, however, which are inflammatory in character, such as conjunctivitis, etc., are not really genuine reflexes, in the sense in which the term has been used heretofore. Here, I think, we need seek no further for the cause than in the simple continuity of tissue. As regards photophobia, asthenopia, etc., in which no inflammatory lesion is recognized, we may simply say that the connection between the two regions is purely sympathetic in character. The more practical question, however, is as regards the success of treatment, and of this it is safe to say, that in none of the reflexes are results more thoroughly satisfactory, and although we know of no tests by which we can make a positive assertion in any given case, that a morbid lesion of the eye is dependent upon a diseased condition of the nasal mucous membrane, certainly in all obstinate ocular troubles, a careful inspection of this region becomes an urgent duty.

While there are no diagnostic signs which enable us to recognize reflex disturbances as due to intranasal disease, it should be borne in mind that those cases in which such phenomena occur, as a rule

<sup>1</sup> *Op. cit.*, p. 176.

<sup>2</sup> *Loc. cit.*

<sup>3</sup> *New York Med. Record*, April 3d, 1886, p. 397.



show evidence of a decided neurotic temperament. Perhaps the one recognized lesion which characterizes a neurosis is vaso-motor paresis in some locality of the body, recognized by physical signs or subjective symptoms. A vaso-motor paresis, occurring in the nasal mucous membrane, then, should, I think, as a rule be regarded as evidence of the neurotic habit, and this we recognize with comparative ease. If on examination of the nasal cavity, we find the mucous membrane swollen to such an extent as markedly to occlude the passage, while at the same time it presents the watery appearance given by the exudation of serum on its surface, while it is not itself notably reddened, it should immediately suggest to us a parietic condition of the vaso-motor control. If, now, a four-per-cent solution of cocaine be applied by means of an atomizer, and the membrane, after contraction, is seen to cling closely to the turbinated bones beneath, showing no evidence of true hypertrophy, we have further indication of a neurotic condition. The point I would emphasize here is, that while in acute or chronic rhinitis the membrane is swollen and reddened as the result of hyperæmia, this hyperæmic condition involves not only the venous sinuses, but the superficial capillaries, while in vaso-motor paresis the venous sinuses alone are distended. In one case we have superficial evidence of an inflammatory process; in the other case, the surface of the membrane shows no marked departure from the normal tint. Again, in inflammatory processes, the surface of the membrane will show mucous secretion. Vaso-motor paresis gives rise to a leakage, by which the normal respiratory function of serous exudation is let loose as it were and serum is freely poured out—a process which is not ordinarily recognized by the naked eye in health. Again, in either an acute or chronic rhinitis, the membrane, after contraction by cocaine, shows evidences of thickening by the deposit of connective tissue. Vaso-motor paresis and inflammation are terms which are used oftentimes rather loosely, as defining the same condition. Now, it should be borne in mind that these two conditions are essentially different. Vaso-motor paresis, as we know, is the first stage of inflammation, but the inflammation really is not established until this paresis is followed by the later inflammatory stages, the escape of leucocytes from the blood-vessels, with the intense nutritive activity taking place in the extra-vascular tissues. Now, the vaso-motor paresis which we recognize as constituting the essential lesion of hay-fever, is the same morbid process which I have attempted to explain as constituting the lesion of the nose which is most frequently connected with the reflex disturbances under consideration. But this process differs from the first stage of inflammation, in that in the nasal mucous membrane we have



a letting-up of vaso-motor control over the large venous sinuses, which are the source of serous exudation in the nasal cavities, constituting the respiratory function of the nose. In the first stage of inflammation, the vaso-motor paresis consists practically of a distention of blood-vessels and nothing more, in the vaso-motor paresis of hay-fever, or of a neurasthenia in which a nasal reflex occurs, there is added serous exudation as a morbid phenomenon, an increase of the normal respiratory function of the nose, whereas an inflammation is an increase of the normal nutritive processes in the nasal lining membrane.

Hack has made much of his cocaine test for the existence of a reflex, making use of it to produce anæsthesia, which, he says, when thoroughly established, oftentimes will abolish the reflex phenomena, which could be demonstrated by the probe before the membrane was anæsthetized. This would apply to reflex cough, laryngeal or faucial spasm, and possibly certain cases of neuralgia. Headache, if it is dependent upon nasal reflex, readily yields to the local application of cocaine in a very few minutes, and here, of course, the diagnosis is immediately established. This, however, I think applies only to the congestive headaches, the result being due to the contractile properties of cocaine, rather than to the anæsthesia. In ocular and other obscure reflexes, we have no method of making a diagnosis other than by observing the success of local treatment.

Nasal polypi and deformities of the nasal septum are not infrequent conditions which give rise to reflex phenomena. I do not think, however, in either of these cases that it is the original lesion which causes the reflex, but rather a paretic condition of the membrane to which they give rise. The mechanism by which a deflected septum causes congestion of the membrane, resulting either in a vaso-motor paresis, as in hay-fever, or in a hyperplasia as in hypertrophic rhinitis, has already been fully discussed elsewhere, and need not be entered upon here, further than to state, that in the ordinary act of inspiration the air immediately behind the point of obstruction in the nasal cavities, is maintained in a state of almost constant rarefaction, resulting in a swelling of the membrane, dilatation of the venous sinuses and ultimately in a paretic condition of the vascular walls. In nasal polypus it is generally stated that the watery secretion which flows from the nose is due to the hygroscopic character of the growth, by which it absorbs and discharges moisture according to the state of the weather. I am disposed to think that the source of the serous exudation here is in the venous sinuses, which under the stimulus of the presence of these irritating growths, assume a condition of paresis, by which serous exudation

constantly takes place. In other words, here also we have a vaso-motor paresis of the mucous membrane, a condition most frequently associated with the reflex phenomena, due to the presence of the growths. The frequency with which polypus is attended with reflex neuroses, I think, is due to the fact that in the majority of cases it impinges upon and irritates the mucous membrane covering the middle turbinated bone, and this region is probably more frequently the source of reflex disturbances than the lower passage, on account of its more delicate sensibility, for in this region we have not only general sensibility, together with the rich nerve-distribution necessary for the management and control of the respiratory function, but also the olfactory nerve distribution, which naturally renders it more susceptible to irritation.

When, therefore, we find a nasal polypus giving rise to an asthma, this is not due directly to the presence of the polypus, but to the morbid condition in the mucous membrane, caused by the presence of the polypus. On the other hand, when a supraorbital neuralgia, or a simple headache, occurs as a reflex symptom, I think we find a more rational explanation of the symptom in saying that it is due to pressure exercised on the peripheral nerves, although Moldenhauer<sup>1</sup> states, that he has never met with a reflex of this character. When an examination fails to reveal any evidence of vaso-motor disturbance in the nasal mucous membrane, we must attribute reflex disturbances to a simple hypertrophic rhinitis. In rare cases, adenoid growths in the vault of the pharynx become a source of reflex symptoms.

The local treatment of those conditions involves no points of interest for discussion, other than those which are sufficiently discussed in the chapters devoted to these special affections. Dr. McBride,<sup>2</sup> of Edinburgh, raises the question whether the control of these reflexes is due to local applications to the nasal membrane, controlling a morbid lesion there, or whether they may not act as counter-irritants; while Ruault, following the same line of suggestion, quotes Bouchard as having cured a case of sciatica by cauterizing the lobe of the ear. Another question may be suggested here, in this same line, as to how much the moral effect of local applications to the nose might divert the patient's mind, and so facilitate a cure. That these influences may have a certain amount of force, is very probable, but this is purely secondary and adventitious. I am convinced that successful results are due primarily and mainly to the removal of the local intra-nasal disease.

As will be gathered from what has been stated above, the neurotic habit is a prominent factor in the production of these disturb-

<sup>1</sup> Loc. cit., p. 180.

British Med. Journal, Jan. 29th, 1887.

ances in many cases, and hence will oftentimes require attention. It is not probable that any large proportion of these patients require general medication, and yet a certain number will not infrequently resist local treatment until internal medication is instituted. In these cases, no measure is of greater importance than the use of cold water. If well tolerated, a cold sponge down the spine once daily, or better still a shower or douche, will aid us very materially. In addition to this, there are two drugs which I regard as of special value, viz.: zinc and belladonna. These may be given either singly, or, as I prefer it, in the following pill:

℞ Ext. belladonnæ, . . . . . grs. v.

Zinci oxidi, . . . . . grs. x.

M. ft. mass. in pil. numero xx. div. S. One pill to be taken three times daily before eating.

Arsenic is a remedy which possesses a certain efficacy in these cases, and may be given in the form of either Fowler's or Pierson's solution, preferably the latter, in doses of three minims, taken three times daily after eating, and gradually increased to five or six, if toleration is established. A form of this drug which has come into considerable favor of late years is "Clemens' solution of the bromide of arsenic." My experience with this remedy, although somewhat limited, leads me to suggest that it deserves further trial.

Iron, strychnine, and general tonics, which we are so often led to prescribe, I think possess but limited value in controlling the neurotic habit, and hence should not be administered unless specially indicated by other general conditions.

## CHAPTER XIV.

### HAY FEVER, OR VASO-MOTOR RHINITIS.

THE term hay fever, although a somewhat unfortunate one, has come into such general use, that it scarcely seems wise to discard it. When the disease was first recognized, it was thought by many to be due to the emanations of dry hay, and hence the term hay-fever became its ordinary designation, as applying to the form of the disease usually met with in the later months of the summer. Subsequent investigation revealed that a form of the disease occurred in the early summer months, to which the name rose-cold was given. Still later we find appearing in the literature of the subject such names as summer catarrh, pruritic catarrh, pollen catarrh, peach cold, etc. The disease is essentially the same in whatever season it may appear, and hence we use the term hay fever as a generic expression, and as embracing all forms of the affection.

DEFINITION.—We may define hay fever, then, as a disease characterized by the annual recurrence, at a certain season of the year, usually the same period in each individual case, of an attack of a more or less aggravated form of influenza, the prominent symptom of which is an intensely swollen condition of the mucous membrane lining the nasal cavities, attended with sneezing and profuse watery discharge, these symptoms being due to the direct impact upon the mucous membrane of the nasal passages of the pollen of certain flowering plants present in the atmosphere. Each individual, as a rule, is susceptible to the action of the pollen of some one or more individual plants, and thus becomes affected annually during the time that this special plant is in flower. In many cases the course of the attack is marked by the development of a paroxysm of spasmodic asthma, or as it is usually termed, hay asthma, which is precipitated by, and is to a large degree dependent upon, the nasal affection.

HISTORY.—Prominent attention was first attracted to this affection by John Bostock,<sup>1</sup> who gives a somewhat detailed account of

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<sup>1</sup> Med. Chirurgical Trans., 1819, vol. v., p. 161.



a mild attack as affecting his own person, although Beschorner<sup>1</sup> in his admirable monograph, has shown that it was recognized by writers as early as the sixteenth century. Thus, Botallus<sup>2</sup> states that he knew persons in whom the odor of roses caused headache, sneezing and itching of the nose, while van Helmont<sup>3</sup> (1577 to 1644) had observed cases in which the odor of sweet-smelling plants seemed to produce symptoms of influenza, with difficult breathing, and in one case, an attack of spasmodic asthma, persisting through the summer months, and disappearing on cold weather. Still later (1673) Binningerus<sup>4</sup> observed a case of what would be now termed merely rose-cold. A similar case was observed by Ledelius.<sup>5</sup> In 1691 J. Constant de Rebecque,<sup>6</sup> in describing a similar case, suggests the name "*coryza a rosarum odore*." Most modern writers assert that the disease is a somewhat aristocratic one, in that it affects only the upper classes. As sustaining this view we find a report by Herlinus,<sup>7</sup> of the case of the Roman cardinal, Oliver Caraffa, who was so susceptible to the odor of roses that his palace gates were kept constantly guarded to prevent the entrance of individuals carrying them. Similar observations were made by Riedlin,<sup>8</sup> Hünerswolf,<sup>9</sup> and Heberden.<sup>10</sup> Bostock's paper in 1819 excited no little attention, and seems to have awakened physicians of the day to the fact that the disease was by no means uncommon, for in a second paper<sup>11</sup> wherein he analyzes twenty-eight cases of the disease which he had collated, he objects to the use of the term hay fever, which apparently had already become current, because, as he says, in his own case he found the emanations of dry hay absolutely innocuous. His conclusions were that the attack was produced by moist heat, sunshine and dust. MacCulloch,<sup>12</sup> observing a certain daily intermittency in the symptoms, suggested the relation between this disease and intermittent fevers, while

<sup>1</sup> "Ueber Heutieber und dessen Behandlung;" Jahresberichte der Gesellschaft für Natur- und Heilkunde zu Dresden, Sitzungsperiode 1885-1886.

<sup>2</sup> "Commentarioli duo, alter de medici, alter de agroti Munere," p. 23. Lugduni, 1565.

<sup>3</sup> "Asthma et tussis." Cap. x., opera omnia, p. 344, Hafnæ, 1707; *ibid.*, cap. xxiv., opera omnia, p. 346.

<sup>4</sup> "Obs. et curat. Medicinæ Centuriæ quinquæ." Cent. secundo, obs. lxxxvi.

<sup>5</sup> "Miscell. Nat. curios.," dec. ii., ann. 2, obs. 140, p. 309 (probably 1682). Lipsiæ.

<sup>6</sup> "Atrium medicinæ Helvetior," obs. 92, p. 15 et seq. Geneva, 1691.

<sup>7</sup> "De remediis sudoriferis et analepticis," p. 32. Lipsiæ, 1693.

<sup>8</sup> "Lineæ medicæ," p. 177. Augustæ Vindelicot, 1695.

<sup>9</sup> "Ephem. nat. curios.," dec. ii., ann. v., obs. xxii., p. 34.

<sup>10</sup> "Commentarii de morborum historia et curatione," pag. 118 et seq., cap. 24, Londoni, 1802, und Derselbe, "Commentary on the History and Cure of Diseases," 9th edition, chapter Destillatio, p. 113. London, 1816.

<sup>11</sup> Med. Chirurgical Trans., 1828, vol. xiv., p. 437.

<sup>12</sup> "Remittent and Intermittent Diseases," London, 1828, vol. i., p. 394.

Gordon,<sup>1</sup> from a careful study of the disease, concluded that it was due to the emanations from flowering grasses, notably from *anthoxanthum odoratum*. A somewhat similar view was adopted by Elliottson,<sup>2</sup> who indorsed the use of the term hay fever. Subsequent contributions were made by Cazenave,<sup>3</sup> Laforgue,<sup>4</sup> and Dechambre,<sup>5</sup> which consisted mainly in the reports of cases. In 1854, Phoebus began a series of very elaborate investigations, pursued by means of printed circulars, issued to different medical societies, which was completed and published in 1862 in the form of a monograph,<sup>6</sup> which was based on the study of one hundred and fifty-four cases. Phoebus estimated at this time, that altogether three hundred cases had been brought under observation. Phoebus's contribution added largely to our knowledge of the disease, and yet the vagueness of his conclusions only serves to illustrate the difficulties which necessarily attend the study of an affection, so varied in its manifestations, and inconstant in its clinical history, and whose exciting causes are so illusive.

The next notable observation on the subject was that of Helmholtz, who in a letter to Binz,<sup>7</sup> detailed the history of his own sufferings from the disease, and propounded the theory, that the symptoms were due to the activity of certain vegetable spores, which he had found in the mucus discharged from his nose. It is a notable fact that most observers, up to this time, based their deductions largely on their own personal experience of the disease. Thus Roberts<sup>8</sup> finds a variety of causes active in producing the exacerbation, while he attaches special importance to personal idiosyncrasy as predisposing to the attacks. In 1873 appeared Blackley's<sup>9</sup> classical monograph, in which he details the results of by far the most thorough and exhaustive series of experiments yet undertaken for determining the causes of the disease. Blackley's scientific methods of study leave no room to question the fact, that the impact of the pollen of flowering plants on the mucous membrane of the upper air passages, is the true source of the symptoms which characterize an exacerbation of hay fever. In 1876 there appeared the admirable monographs of Wyman<sup>10</sup> and Beard.<sup>11</sup> The former

<sup>1</sup> London Med. Gazette, 1829, vol. iv., p. 266.

<sup>2</sup> London Med. Gaz., 1831, vol. viii., p. 411.

<sup>3</sup> Gaz. Médicale, 1837, p. 631.

<sup>4</sup> Union Médicale, December 17th, 1859.

<sup>5</sup> Gaz. Hebdomadaire, 1860, p. 67.

<sup>6</sup> "Der typische Frühsommer-Katarrh oder das sog. Heufieber, Heu-Asthma," Giessen, 1862.

<sup>7</sup> "Pharmakologische Studien über Chinin," Virchow's Arch., Feb., 1869, p. 100.

<sup>8</sup> New York Med. Gaz., Oct. 8th, 1870, p. 226.

<sup>9</sup> "Hay Fever," London, 1873; and 2d ed., 1880.

<sup>10</sup> "Autumnal Catarrh," New York, 1876.

<sup>11</sup> "Hay-fever, or Summer Catarrh," New York, 1876.

made an exhaustive study of the geographical features of the disease as it is known in America, establishing the fact that in certain regions patients were exempt from their annual visitation; while Beard, following the method of Phoebus, pursued his investigation by means of circulars sent to physicians and others throughout the country, thus collecting a series of over two hundred cases, an analysis of which led him to the conclusion that the disease was essentially a neurosis. In 1877, Marsh<sup>1</sup> published his well-known essay, in which special emphasis was laid on the activity of the pollen of rag-weed, or *ambrosia artemisiæfolia*, as previously noted by Wyman. An exceedingly important observation was made by Daly<sup>2</sup> in 1882, who questions "whether we are warranted in believing any case of hay asthma purely a neurosis, without first eliminating the possible causation due to local structural or functional disease in the naso-pharynx." The importance of Daly's paper cannot be overestimated, I think, in thus suggesting a diseased condition of the nasal cavities as being an important factor in all cases of hay fever, a fact which, while at first received with considerable hesitancy, is, I think, generally accepted now by all observers. In 1883 appeared important papers by Hack,<sup>3</sup> Roe,<sup>4</sup> Hertzog<sup>5</sup> and Sajous,<sup>6</sup> in which a morbid condition of the nasal mucous membrane was recognized as a predisposing factor of the disease. We now meet with the first recognition of the inappropriateness of the term hay fever in the suggestion of Hertzog, that the disease might more properly be termed *rhinitis vasomotoria*. In the following year was published a paper by Harrison Allen,<sup>7</sup> in which the importance of an obstructive lesion in the nose was emphasized, as a predisposing cause of the disease, and in the same year appeared a very suggestive paper by John Mackenzie,<sup>8</sup> in which he designates the disease *coryza vasomotoria periodica*. In 1884 there also appeared Morell Mackenzie's second volume<sup>9</sup> in which he discusses hay fever in a very lucid manner, adopting the pollen theory of Wyman and Blackley, while he seems rather to attach little importance to a diseased condition of the nasal mucous membrane as a predisposing factor. It is noticeable, however, that, in subsequent monographs on the subject,<sup>10</sup> he recognizes the fact, that in the

<sup>1</sup> Trans. Med. Society, State of New Jersey, 1877.

<sup>2</sup> Arch. of Laryngology, vol. iii., No. 2, p. 157.

<sup>3</sup> Wien. Med. Wochenschr., No. 14, 1883.      <sup>4</sup> N. Y. Med. Journal, May 12th, 1883.

<sup>5</sup> Allgemein. Med. Central-Zeitung, Oct. 24th, 1883, p. 1, 125.

<sup>6</sup> Med. and Surg. Reporter, Dec. 22d, 1883.

<sup>7</sup> American Journal of Med. Sciences, Jan., 1884, p. 157.

<sup>8</sup> New York Med. Record, July 19th, 1884.

<sup>9</sup> "Diseases of the Throat and Nose," London, 1884.

<sup>10</sup> "Hay Fever," London, 1884; 3d. ed. 1885; 4th ed. 1887.



majority, if not in all cases of hay fever, the nasal mucous membrane presents evidence of disease. In 1886, the author<sup>1</sup> published a paper in which it was argued that the prominent predisposing cause of all cases of hay fever was an obstructive lesion in the nose, giving rise to a vascular dilatation, caused by the rarefaction of air in the nasal chambers behind the point of obstruction, and further that three conditions were essential for the production of the disease: (1) an obstructive lesion in the nose, (2) a neurotic habit, and (3) the impact of pollen upon the nasal mucous membrane. At the same time it was argued that hay fever and asthma were identical, in that one disease was a vasomotor rhinitis while the other was a vasomotor bronchitis. In the same year, Beverley Robinson<sup>2</sup> took the ground that an obstructive lesion of the nasal mucous membrane was not necessarily a part of the disease. In 1887 Sir Andrew Clark<sup>3</sup> published a paper on the subject, pursuing much the same line of argument as that already advocated by the writer, in assigning three causes for the disease, viz.: a neurotic habit, an intra-nasal pathological condition, and an external exciting cause. The later literature of the subject recognizes and indorses these views, and we find few writers who do not accept what I think is to be regarded as the most important of these conclusions, viz.: that which regards a morbid lesion of the nasal membrane as a prominent factor in causing the attacks.

ETIOLOGY.—Bostock<sup>4</sup> in his first paper, which was based entirely on his own personal experience, seems to have arrived at no conclusion as to the cause of the disease. At the time of the publication of his second paper,<sup>4</sup> the idea seems to have been prevalent that the emanations of dry hay had much to do in causing the attack, although Bostock himself regarded this as less active than heat and physical exertion. The elaborate investigations of Phoebe<sup>5</sup> also led him to the conclusion that sunlight played an important part in the production of the disease, although he conceded a certain amount of activity to the emanations from flowers and grasses. Subsequent investigations merely served to specify the peculiar characteristics of dust and vegetable emanations which caused the attacks, in determining that the pollen of certain flowering grasses and plants was the morbid agent. I think a great mistake was made by these investigators, in that while searching successfully for the cause of an exacerbation of hay fever, they

<sup>1</sup> "Hay Fever, Asthma and Allied Affections," N. Y. Med. Journal, April 24th and May 1st, 1886.

<sup>2</sup> Med. News, July 17th, 1886.

<sup>3</sup> "Speedy and Sometimes Successful Method of Treating Hay Fever," Brit. Med. Journal, June 11th, 1887, p. 1,255.

<sup>4</sup> Loc. cit.

<sup>5</sup> Op. cit.



seemed to regard this as a cause of the disease itself. When we have discovered the specific agent which produces the attack, we have not explained why any given individual should be subject to this specific cause, while numberless others are exempt. Beard's admirable brochure, then, was a notable departure from the line of investigation hitherto pursued, in that the analysis of the large number of cases which he collated, proved beyond question, as it seems to me, that the neurotic habit was present in all individuals subject to hay fever, and still later, Daly's<sup>1</sup> original suggestion of a local morbid condition of the nasal mucous membrane added a third factor to the causation of the disease. We thus find that there are three essential conditions necessary for the production of an exacerbation:

1. The presence of pollen in the atmosphere,
2. A neurotic habit, and
3. A local morbid condition of the nasal mucous membrane.

I think, these three conditions are, unquestionably, present in all cases, and that no individual is liable to an attack in whom one or more of these conditions is absent, as a fuller consideration will easily demonstrate.

1. *The Presence of Pollen in the Atmosphere.*—The pollen theory of hay fever has probably received larger discussion than any other. Its advocates, and those who deny its activity, maintaining their individual positions with considerable skill, and oftentimes with no little acerbity. Certainly, when the pollen theory is advocated as fully explaining an attack of hay fever, the position undoubtedly cannot be maintained; but that the presence of pollen in the atmosphere, and its impact upon the mucous membrane of the upper air passages is the immediate cause of the exacerbation, I think cannot be questioned, in view of the exhaustive experiments, and unassailable conclusions of Blackley,<sup>2</sup> which are of so interesting a character as to warrant their being detailed somewhat fully. Blackley himself was a victim of hay fever, coming on about the 10th of June. He made a series of experiments to determine the amount of pollen in the atmosphere, extending through several seasons, from 1866 to 1878, using for this purpose different devices. The apparatus which gave the most accurate results, consisted of a disc of glass, seven-eighths of an inch square, mounted on a central staff, which was surmounted by a weather-vane, the disc itself being protected by a hood. This apparatus was exposed under varying atmospheric conditions, and in different situations, usually in an open field. The device for collecting the pollen consisted in placing vertically in a slot, on the surface of this glass plate, a micro-

<sup>1</sup> Loc. cit.

<sup>2</sup> Op. cit.

scope slide, one centimetre in diameter, which was coated with a preparation of glycerin, by which the pollen floating in the atmosphere settling upon the slide remained adherent to it. This plate was generally exposed day after day for a certain fixed period, usually about twenty-four hours, the object of the vane being to keep the vertical slide directed constantly to windward. From the 28th of May to the 7th of June, pollen was found in the air in small quantities. On the 30th of May the number found on the slide was twenty-five, and with this number he began to suffer with perceptible, but not troublesome symptoms. On the 8th of June the number rose to seventy-six. On the 11th of June, however, the number of pollen grains found on the small discs rose to a little over two hundred and eighty, and it was at this date that the experimenter began to have unmistakable signs of the commencement of his summer attack in a troublesome form. From the 11th of June onward, the amount of pollen varied in a notable degree, until on the 28th of June he counted eight hundred and eighty grains on his disc. He noticed that on rainy days the amount decreased in a very marked degree, while at the same time his symptoms very notably abated, although on warm days following rain, the number of grains increased very markedly. Moreover, he noticed that a few hours' rain made no perceptible difference in his symptoms, whereas a rain of twenty-four hours or longer gave very striking relief, in connection with a notable decrease in the number of grains of pollen found. From the 28th of June onward, there was a gradual diminution, until the 1st of August, when the pollen disappeared, with complete abatement of all his symptoms. These experiments, it seems to me, are not only conclusive as far as the individual case is concerned, but also their accuracy and nicety of detail, and their complete demonstration of the close relation between the symptoms and the amount of pollen discovered, go far toward absolute proof of the pollen theory, so-called, in all cases of hay fever. Furthermore, Blackley's experiments were not conducted in connection with his own individual case alone, but with others.

The question arises here, How does pollen act on the mucous membrane? This we cannot answer, other than to state that it produces vascular dilatation, when present in the atmosphere in certain quantities. Thus, Blackley has shown that the condition of the atmosphere, which will deposit twenty-seven grains of pollen on a disc one centimetre in diameter, in twenty-four hours, is un-irritating, but increase the strength of the atmospheric suspension of pollen, until it will deposit two hundred and eighty, and we find it producing marked symptoms of irritation. In the same way, a

solution of cocaine one grain to the ounce, will have little or no effect locally applied to the mucous membrane, increase the strength of the solution to twenty grains to the ounce of water, and apply it to the mucous membrane, and the result is marked contraction of the blood-vessels. In other words, pollen in the air produces vascular dilatation in certain individuals, in exactly the same manner as a solution of cocaine produces vascular contraction. The most active pollens in the production of hay fever are those of the flowering grasses, such as the different varieties of meadow grass, sweet-scented vernal grass, meadow fox-tail, golden-rod, etc. Thus, Blackley found in his investigations that the pollens of these plants constituted ninety-five per cent of the pollens present on his discs. In America, rag-weed enjoys the reputation of being the most active of all plants in producing the autumnal form of the disease. The activity of the pollen of roses is well known, as well as that of the cereals, wheat, rye, Indian corn, oats, etc. In general it may be stated, that probably all pollens which are found floating in the atmosphere, or the so-called anemophilous pollens, possess a certain amount of activity, while the coherent or entomophilous pollens are innocuous. Peaches are also said to excite attacks. This, however, is explained by the fact, that the coat of the peach presents a favorable site for the lodgment of pollen grains, and in that undoubtedly lies the source of irritation. The same may be stated of other fruits, such as pears, plums, the flowers and stalks of potatoes, etc.

2. *The Neurotic Habit.*—The neurotic habit, as demonstrated by Beard, is an essential element of causation in hay fever, and serves to explain why certain individuals are sensitive to the action of a pollen-laden atmosphere, while others are exempt. What the essential pathological lesion is, in what we call the neurotic element in hay fever, it is not easy to explain. If we term it an idiosyncrasy, it adds nothing to our information, and yet its existence cannot be questioned. These peculiar idiosyncrasies have been recognized by observers from the earliest times. Under this category can be placed those cases in which violent sneezing is excited by the presence of ipecac, nausea by the odor of camphor, urticaria by eating shell-fish, and the poisoning of *Rhus toxicodendron*, etc. These are simple clinical facts which admit of no classification or systematic consideration. In the same manner, clinical investigation shows in a sufficiently large proportion of cases of hay fever, the existence of a family history showing evidence of neurotic tendencies, such as fully to justify the conclusion, that behind all cases of hay fever lies a neurotic habit, as a powerful predisposing cause of the disease.



3. *A Local Morbid Condition of the Nasal Mucous Membrane.*—A local morbid condition of the nasal mucous membrane, as a predisposing cause, is present in probably all cases of true hay fever. This lesion must necessarily be one of an obstructive character, and one attended with vascular dilatation. The primary lesion, probably in most cases, is the obstruction, as shown by Harrison Allen.<sup>1</sup> The method by which an obstructive lesion in the nose may give rise to local conditions favoring the development of hay fever has already been described in the chapter on hypertrophic rhinitis, the essential condition being that an obstruction in the anterior part of the nasal chambers gives rise to a diminution of air pressure immediately behind the point of obstruction, in every act of inspiration. This process going on for any lengthened period of time, will necessarily result in a permanent dilatation of the blood-vessels of the soft spongy tissues covering the lower and middle turbinated bones, thus rendering the parts susceptible to the action of the pollen, in that its impact upon a mucous membrane, whose blood-vessels are already weakened, and their contractility impaired, exercises its peculiar action with less resistance.

In addition to the three elements of causation already described, I think we must recognize a psychical influence in many of these cases, as acting to produce the attacks, a peculiar mental anticipation, as it were, which can only explain the fact of the annual recurrence of the disease at fixed dates, some patients going so far as to notice that their disease recurs even at a certain hour of the day each year. Now with the varying character of our seasons, it is impossible that the plant which is the active cause of an attack of hay fever in any individual case, should flower at exactly the same time each year, or that the pollen of these grasses should permeate the atmosphere in a sufficient quantity, as that for instance, Blackley's discs would contain two hundred and eighty grains on the 11th of June each year. We can, therefore, only explain the recurrence of attacks in certain cases on fixed dates each year, by the fact that the individual's mind is so far concentrated on the anticipation of his attack, that when the day comes the hay fever symptoms set in. This psychical influence is well illustrated by the case of John Mackenzie<sup>2</sup> in which an attack of rose-cold was precipitated by means of an artificial rose. Mackenzie<sup>3</sup> also reports a case in which an attack of hay-fever was brought on by a patient's gazing upon a picture of a field of hay. The explanation of these cases, I take it, is much the same as that of those cases of intermittent fever in which the paroxysm is postponed by altering

<sup>1</sup> Loc. cit.

<sup>2</sup> American Journal of Med. Sciences, Jan., 1886.

<sup>3</sup> "Hay Fever," London, 1887, p. 56.



the hands of the clock. Many of the earlier writers regarded heat and sunlight as active among the causes of hay fever. This is not to be wondered at, for we not infrequently find patients recognizing this apparent influence. This mistake is accounted for by Blackley, who has shown that the true explanation lies in the fact that a hot dry day is exceedingly favorable for the dissemination of pollen, whereas rainy weather, while interfering with its diffusion, favors its development, hence, pollen becomes unusually active where rainy weather is immediately followed by a heated period.

The minute organisms which Helmholtz discovered in the mucous discharge from the nose, to whose activity he attributed the symptoms of his disease, have never been verified by other observers. It is altogether probable that what Helmholtz really saw, were fragments of mycelium-like threads thrown out by the pollen-cells, under the influence of heat and moisture, and containing the minute fovillæ of the pollen-cell. The relief which Helmholtz obtained by the injection of his quinine solution, therefore, must be attributed largely to psychical influence, for while immediately following the publication of Helmholtz's experience, the use of quinine solutions became exceedingly popular, it has fallen into complete disuse at the present day. Thus, De Budberg<sup>1</sup> cites a case treated after Helmholtz's method with complete success. It was found, however, that a douche of chlorate of potash solution was equally efficacious. In this case a large number of spores were found in the mucus, which De Budberg regarded as pollen granules.

Age seems to exert a certain predisposing influence in the causation of the disease, in that the larger number of cases develop early in life. Thus, in a series of eighty cases observed by the writer, there occurred:

Between the ages of	1 and 10,	.	.	.	9 cases.			
"	"	"	"	10 " 20,	.	.	.	27 "
"	"	"	"	20 " 30,	.	.	.	16 "
"	"	"	"	30 " 40,	.	.	.	21 "
"	"	"	"	40 " 50,	.	.	.	3 "
Over 50,	.	.	.	.	.	.	.	4 "
Total,	.	.	.	.	.	.	.	80 cases.

We thus find the large proportion of cases occurring between the ages of ten and twenty, while the predisposition seems to disappear very largely at the age of forty, although rather curiously, among my own cases, I have had under treatment a patient in whom the disease developed at the age of seventy-three. Wyman,<sup>2</sup> in an

<sup>1</sup> Brit. Med. Jour., vol. ii., p. 18, 1881.

<sup>2</sup> Loc. cit., p. 97.

analysis of the seventy-two cases which he collated, found the disease occurring as follows:

Under 10 years of age,	.	.	.	.	11 cases.
Between 10 and 20,	.	.	.	.	15 "
" 20 " 30,	.	.	.	.	25 "
" 30 " 40,	.	.	.	.	8 "
" 40 " 50,	.	.	.	.	11 "
Above 50,	.	.	.	.	2 "

These results differ, as will be seen, somewhat from my own, although it should be stated that my own tables give the date of occurrence of the first attack, while Wyman simply reports the age of the patient at the time of observation. All writers coincide in the statement that the disease belongs essentially to the better educated classes, and that it occurs very rarely among the laboring people. This we can easily understand, when we consider that the disease is essentially a neurosis, and that its development is favored by the surroundings and habits of life of the upper classes, while the contrary is true among the laboring people.

That the large preponderance of cases occur among males, is also a fact noted by all observers. Of my own cases, fifty-eight were males, while twenty-two occurred in females. Of Wyman's seventy-two cases, twenty-five were females and forty-seven males. Of two hundred cases reported by Beard<sup>1</sup> one hundred and thirty-three were males and sixty-seven females, while Phoebus, out of one hundred and fifty-four cases, found one hundred and four males and fifty females. We thus find in five hundred and six cases, three hundred and forty-two males and one hundred and sixty-four females. This observation would seem rather to conflict with the idea that hay-fever is essentially a neurosis, in that we ordinarily associate the delicate female physique with a neurotic temperament. I do not think it is a well-established fact, that frail physical development is a necessary feature of the nervous temperament, so that I do not think that these statistics argue against the fact of hay fever being a neurotic disease. The true explanation of the preponderance of male cases of hay fever, is in the fact that males are much more exposed to those conditions which favor the development of catarrhal disease, such being not only traumatic causes as previously discussed, but also the varying conditions of climate and weather. This fact, then, would seem to lend weight to the view already indorsed, that a catarrhal affection of the upper air passages is a powerful predisposing cause to the development of hay fever.

<sup>1</sup> Loc. cit., p. 43.

The powerful influence of heredity is well illustrated by Wyman's statistics, who found that in one-fifth of all his cases, more than one member of the same family was affected. The same is true of eighteen of my own eighty cases, while in thirty-nine cases there was either hay-fever or asthma in the family. Wyman<sup>1</sup> further quotes in illustration of this feature of the disease, the very curious case of the family of Chief Justice Shaw, who was the only child, in a family of several, who arrived at maturity; his mother had autumnal catarrh; out of four children one son is a sufferer; a son and a daughter have summer cold; a son who has autumnal catarrh, has a daughter who is now twenty-two, who has had autumnal catarrh six or eight years. Another striking case is that of the Rev. Henry Ward Beecher, whose sister and nephew suffered from the disease.

The impairment of the general health which is occasionally observed after a protracted convalescence from a continued fever, would occasionally seem to act as a predisposing cause of hay fever. Thus, Sajous<sup>2</sup> has observed cases coming on after an attack of typhoid fever, whooping cough, malaria and chicken pox, an observation which fully coincides with my own clinical experience.

Diathetic conditions probably exert little if any influence upon the development of the disease, and yet Leflaive<sup>3</sup> believes that it is a manifestation of the gouty diathesis, an opinion also shared by Lermoyez.<sup>4</sup>

**PATHOLOGY.**—The essential pathological changes which take place in the nasal mucous membrane, are not those which characterize an inflammatory process, and yet from the various names which have been proposed for the disease, such as Rhinitis vasomotoria (Hertzog), Coryza vasomotoria periodica (John Mackenzie), Rhinitis sympathetica, etc., the inference would naturally be drawn that the exacerbation is regarded as an inflammatory process. Now, it should be stated that the first stage of an inflammation is vasomotor paresis, hence every case of rhinitis, whether periodical as the result of pollen, or idiopathic, is a vasomotor process, hence the use of this expression would seem to be redundant. Furthermore an inflammatory process runs through certain definite stages, and usually terminates by spontaneous resolution. This is not the case in an exacerbation of hay fever, for although its onset in some cases is gradual, in others it comes on quite suddenly, but in its termination it is apt to be quite abrupt, all the symptoms disap-

<sup>1</sup> Loc. cit., p. 103.

<sup>2</sup> "Diseases of the Nose and Throat," Philadelphia, 1887, p. 178.

<sup>3</sup> "Rhino-bronchite Annuelle," Paris, 1887.

<sup>4</sup> Annales des mal. de l'oreille, March, 1888.



pearing immediately on the escape of the individual from the pollen-laden atmosphere. Moreover, the appearances of the membrane in the nose, as will be shown later, do not present the characteristic features of an inflammatory action. In order to understand what the essential lesion is in an exacerbation of hay fever, it is necessary that we should fully appreciate the physiological function of the nasal mucous membrane in respiration. This, as has already been shown before, consists in a process of serous exosmosis, by which there is poured out on the surface of the mucous membrane lining the nasal cavities, from twelve to sixteen ounces of water in twenty-four hours, this process being directly under the control of the sympathetic system of nerves, by which the amount of serum discharged is regulated with an extreme degree of nicety, according to the varying conditions of the atmosphere. Now, the pollen of flowering plants, as has already been noted, possesses the peculiar property of producing more or less complete paralysis of the nerves which control this exosmotic function, in other words the impact of pollen upon this membrane produces a complete relaxation of the large veins which compose the turbinated bodies, under which they become dilated, and their walls admit of free transudation of serum, the veins remaining in this state of dilatation as long as the pollen is present upon the surface of the membrane in sufficient amount, regaining, however, their normal calibre immediately upon the removal of the exciting cause. The capillary blood-vessels of the mucous membrane proper, as a rule, are not involved in the morbid changes which take place in the deep tissues. The pollen, moreover, acts only to dilate those blood-vessels which are involved in this respiratory process, namely the venous sinuses of the turbinated bodies, for we find that the blood-vessels of the mucous membrane proper are unaffected by its action, retaining their normal calibre. We thus find that the exacerbation is due entirely to peripheral causes. It might be charged that this view militates against the neurotic theory. The part which the general predisposing neurosis plays in the production of the disease, is that it gives rise to a weakness of the vaso-motor control, which the sympathetic and trigeminus nerves exercise over the calibre of the venous sinuses, whereby they are rendered susceptible to the action of pollen. The question arises now, whether this vaso-motor susceptibility can be accounted for in any other way than by conceding some pathological change in the ganglionic centres. This is a question which cannot easily be decided, and any discussion of it can be carried on only upon purely theoretical grounds. I see no reason, however, why the condition may not exist, without necessarily involving the nerve centres in pathological changes, although



the theory of a central lesion is ably advocated by John Mackenzie<sup>1</sup> who designates it as a "disordered functional activity of the nerve centres," while Kinnear<sup>2</sup> is more definite in his conclusions, finding two forms of the disease, which are due in one case to a hyperæmia, and in the other to a condition of anæmia of the sympathetic ganglia. Hack,<sup>3</sup> on the other hand, believes that the morbid lesion consists essentially in a hyperæsthetic condition of the olfactory and the fifth pair of nerves. The same view is also entertained by Robinson.<sup>4</sup>

**SYMPTOMATOLOGY.**—The onset of the attack is marked by a sense of irritation referable to the upper regions of the nasal chambers, with a sense of fulness or tightness across the bridge of the nose, accompanied with sneezing of more or less violent character. At the same time patients complain of a curious burning or itching sensation about the roof of the mouth, apparently referable to the upper surface of the soft palate. As the attack develops, the nasal membrane becomes swollen, and the passages thereby more or less completely occluded. At the same time the serous exudation sets in, pouring out on the surface of the membrane, and escaping from the nostrils in, oftentimes, large quantities. So profuse is this discharge, that patients oftentimes feel apparently the passage of the serum in its escape from the blood-vessels, in a sense of intense irritation or formication about the root of the nose. The escape of serum seems to increase the intense irritation in the passages, as shown by the increased violence of the sneezing, which often occurs in paroxysms of considerable duration. With the occurrence of the nasal symptoms, in many cases there is felt at the same time irritation of the mucous membrane of the eyes, and in rarer cases even of the mouth and ears. These symptoms are undoubtedly due to the pollen acting on these membranes in exactly the same manner that it acts upon the nasal passages. This, I think, was conclusively demonstrated by the experiments of Blackley<sup>5</sup> who prepared a decoction of the pollen of *gladiolus*, the injection of one drop of which into the eye, being followed almost instantly by an intense congestion, and finally œdema of the conjunctiva, with pain and photophobia. This would indicate that susceptibility to the action of pollen is not necessarily confined to the air passages. Blackley<sup>6</sup> found the mucous membrane of the mouth also sensitive to the irritation of pollen.

<sup>1</sup> "Coryza Vasomotoria Periodica," N. Y. Med. Record, July 19th, 1884.

<sup>2</sup> "Hay Fever: A Disease of Central Nervous Origin." N. Y. Med. Record, July 14th, 1888, p. 32.

<sup>3</sup> Wien. Med. Wochenschr., 1883, No. 14.

<sup>4</sup> Philadelphia Med. News, July 17th, 1886.

<sup>5</sup> Op. cit., p. 103.

<sup>6</sup> Op. cit., p. 104.

These symptoms commencing somewhat mildly on the first day of the attack, gradually increase until the exacerbation has reached its full height at the end of the third or fourth day, by which time the mucous membrane of the whole upper air tract is swollen and intensely irritated, the nasal passages being as a rule completely occluded, while at the same time there is a constant dripping of serum from the nostrils, in quantities sufficient oftentimes to saturate six or eight handkerchiefs in the course of the day.

The blood in the membrane shows a certain hydrostatic characteristic, in that it tends to collect in the most dependent portion. Thus, if the sufferer lies on the back, the fluids collect in the posterior extremities of the turbinated bodies in such a way as to completely occlude the nares, while lying on the side will often have the effect of securing patency of the uppermost nasal passage, while the fluid collects in the lower. The escape of fluid from the nostril often causes an eczema of the skin about the margin of the nostrils and upper lip, which is aggravated by the constant use of the handkerchief. These symptoms show a mild tendency to abatement during the night, which is probably due to the fact, that the air of the sleeping apartment is less laden with pollen than the atmosphere breathed during the day. The waking hours, however, constitute a period of almost unbroken discomfort, and oftentimes suffering. The onset of the attack in most cases is sudden and without warning, although occasionally it is preceded by a feeling of general malaise, with loss of appetite and mental depression, these premonitory symptoms persisting during the course of the exacerbation to a more or less well-marked degree. Aside from these symptoms, evidences of the effect of the disease on the general system are not present. Thus Blackley<sup>1</sup> in a series of careful observations of pulse and temperature, found no deviations from the normal.

After the disease has persisted for a varying period of time, usually about two to three weeks, in a certain number of cases an attack of asthma sets in, marked by the ordinary symptoms which characterize any attack of so-called nervous or spasmodic asthma. The patient having fallen asleep, is awakened at the end of two or three hours with oppression of breathing, which persisting for some hours, ceases in the early morning, only to return again the following night. These asthmatic attacks rarely occur with the first attack of hay fever, but the repeated annual visitation seems to develop a tendency, which results eventually in the development of the bronchial disorder.

The question arises whether the asthma is due to the hay fever,

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<sup>1</sup> *Op. cit.*, p. 205.

or whether they both may not be due to the same cause. I have already discussed elsewhere the connection between hay fever and asthma, taking the ground that they are essentially one and the same disease, regarding hay fever as a vaso-motor paresis of the walls of the blood-vessels lining the nasal cavity, while asthma is a vaso-motor paresis of the blood-vessels of the mucous membrane lining the bronchial tubes; an attack of asthma consisting in a sudden dilatation of the blood-vessels of the bronchial mucous membrane producing a structural stenosis of these tubes, giving rise to the characteristic inspiratory and expiratory dyspnoea, while hay fever is due to a paresis of the walls of the blood-vessels forming the turbinated bodies, giving rise to their excessive dilatation, thus causing nasal stenosis with profuse serous exosmosis. This being true, the walls of the blood-vessels of the bronchial mucous membrane in a hay-fever patient are in a condition peculiarly favoring their becoming relaxed, when the special exciting causes become active, for the general neurotic condition which renders the nasal membrane of a patient susceptible to the action of pollen, undoubtedly acts to render the bronchial mucous membrane predisposed to its action. This condition, then, of the bronchial mucous membrane being present, we can easily understand why the nasal disorder persisting for ten days to two weeks or longer, should result finally in bringing on an attack of bronchial asthma, in much the same manner as an obstructive lesion in the nose predisposes to hay fever, as already described, for here we have two factors acting.

Nasal stenosis tends to produce rarefaction of air in the bronchial passages with every act of inspiration, thus producing a tendency to dilatation of the bronchial blood-vessels; and again, there is an intensely active and quick sympathy between the nasal mucous membrane and the bronchial mucous membrane, under which a diseased condition in the nasal cavity tends to develop a similar morbid condition in the bronchial mucous membrane. It is probable also that the pollen acts with a certain amount of potency on the bronchial membrane, in much the same manner as upon the nasal membrane. The reason why it does not act to produce an attack of asthma with the first onset of the hay-fever, probably lies in the fact that this susceptibility in the bronchial tubes only occurs after they have been subjected to the weakening influence of the nasal disorder for a certain period of time. As the patient goes through his attack year after year, it is noticeable that the asthma occurs in many cases earlier each year, until finally the asthma sets in immediately on the advent of the hay-fever season. Still another curious fact noticed in these cases, is that not infrequently the bronchial asthma seems to take the place of the hay fever, and



that a patient may suffer for a number of years with hay fever alone, subsequently having developed asthma in connection with the hay fever, the hay fever gradually subsides, and his attack becomes what is called hay asthma, or spasmodic asthma, occurring and persisting through the hay-fever season without hay-fever symptoms. A still further change I have seen in these cases, by which the disorder becomes a perennial asthma, or in other words, asthmatic attacks occur at all seasons of the year without reference to pollen in the atmosphere.

It is a notable fact in connection with cases such as these, that the purely nervous element, as manifested by the general systemic condition, seems to have increased in a very marked degree. Why, then, in these cases the hay fever should disappear and the asthma take its place, it is not easy to explain, unless possibly that the peripheral irritation has resulted in an intensely irritable condition of the ganglionic centres, or possibly some organic change occurs there, the result of which is that they gradually become overtaxed, as it were, or less sensitive to the periodical stimulation, characteristic of the hay-fever season. The essentially neurotic character of the disease is still further shown by the fact that in a certain number of cases the attack is preceded by a cutaneous eruption, usually of a lymphatic character, although Laflaive<sup>1</sup> has met with cases of urticaria and even eczema.

COURSE AND DURATION.—In a very large majority of cases of hay fever, the annual attack commences in the latter part of August, and lasts until frost sets in. The usual date assigned is the 29th of August. Many patients assert that their attack recurs each year on exactly the same date, and even at the same time of day, although in most cases the date varies, it may be, several days. As before stated, I believe that in those cases in which the date and hour of the attack are absolutely unvarying, it is due to a peculiar state of mental anticipation which precipitates the attack. I know of no reason why so large a proportion of individuals are attacked in August, other than the fact that the pollen of rag-weed, as demonstrated by Wyman, Marsh and others, is probably the most virulent of all the pollens, and that this weed fructifies most actively at this time. Moreover, rag-weed flourishes throughout a large portion of the country, in a state of luxuriance that is equalled by few other of the anemophilous plants. These cases are usually designated as autumnal catarrh. The next in frequency to this variety, is that which occurs in June, and which is commonly spoken of as rose-cold, from the fact that these patients are susceptible to the action of the pollen of the different varieties of roses which flourish at this

<sup>1</sup> "Rhino-Bronchite Annuelle," Paris, 1887, p. 47.



season of the year. Most writers have regarded all cases as coming under these two varieties. Beard<sup>1</sup> lays special emphasis on the fact, that he had demonstrated a third variety as occurring in September. As before stated, however, this classification I think only serves to add confusion to the subject, as the disease is essentially the same at whatever season it occurs, and, moreover, in not a few instances we find that patients subject to the so-called rose-cold, are subsequently attacked in August with what is called autumnal catarrh. Still further, an analysis of cases will show that the attack may come on at any time from the first of May to the last of September. Thus, Beard<sup>2</sup> found that the attack set in, as follows:

From May	1st to 10th,	.	.	.	.	.	2
"	" 10th " 20th,	}	.	.	.	.	6
"	" 20th " 31st,	}	.	.	.	.	6
"	June 1st " 10th,	.	.	.	.	.	11
"	" 10th " 20th,	}	.	.	.	.	8
"	" 20th " 30th,	}	.	.	.	.	8
"	July 1st " 10th,	.	.	.	.	.	6
"	" 10th " 20th,	.	.	.	.	.	6
"	" 20th " 31st,	.	.	.	.	.	7
"	August 1st to 10th,	.	.	.	.	.	7
"	" 10th " 20th,	.	.	.	.	.	81
"	" 20th " 31st,	.	.	.	.	.	54
"	September 1st to 10th,	.	.	.	.	.	7
"	" 10th " 20th,	.	.	.	.	.	1
"	" 20th " 30th,	.	.	.	.	.	2
Total . . . . .							198

These figures only apply to the onset of the attack, its duration not being given. An analysis of the duration of the disease in my own eighty cases is as follows:

From May	1st to frost,	.	.	.	.	.	1
"	" 15th-25th to July 1st,	.	.	.	.	.	3
"	" 10th to August 1st,	.	.	.	.	.	1
"	June 1st " July 1st,	.	.	.	.	.	2
"	" 1st " " 14th,	.	.	.	.	.	1
"	" 1st " frost,	.	.	.	.	.	5
"	" 10th " July 4th,	.	.	.	.	.	4
"	" 10th " " 26th,	.	.	.	.	.	5
"	July 1st " Sept. 1st,	.	.	.	.	.	1

<sup>1</sup> Op. cit., p. 49.

<sup>2</sup> Op. cit., p. 50.

From July 10th to Aug. 1st,	. . . . .	I
" " 10th " Sept. 1st.	. . . . .	I
" " 25th " frost,	. . . . .	4
" Aug. 10th-27th to frost,	. . . . .	51
<hr/>		
Total . . . . .	. . . . .	80

A mere glance at these figures, I think, shows conclusively the futility of any attempt at a close classification. Furthermore, it is impossible to assign any special pollen as the active irritant in any of the above classes, inasmuch as definite facts of this character could only be ascertained by very close personal experimentation and observation, and of this few patients are capable. It should be added, moreover, in regard to these cases, that it is exceedingly difficult to elicit an accurate clinical history from the patient, without close questioning, and even then, the principal points of the histories which an inquirer desires to ascertain, are but vague impressions, hence their answers will be of a very general and indeterminate character, based on an imperfect recollection of their last annual attack.

The above figures refer to the disease as manifested in America. In England it usually appears in May and June and rarely lasts into September. The same is true of France, Germany and other European countries. The autumnal variety of the disease would seem then to be exclusively American. An interesting question in this connection arises as to whether the disease is not greatly on the increase. Certainly it fills a much larger space in our literature than ever before, and this is increasing from day to day. Thus, in 1862 Phoebus, as the result of three years' labor was only able to collate one hundred and fifty-four cases, while Beard in 1876 was able to collate two hundred, whereas, at the present time, collated cases could easily be made to reach into the thousands. This can be explained either by the fact that, with increased knowledge of the disease, cases come under observation more frequently, or that the number of cases which occurs has greatly increased. My own impression is that the latter is true. This belief is based not only on the fact that a larger number of cases come under my own personal observation each year, but on the increased severity of the symptoms observed to develop year by year; as, in many instances, a patient hitherto suffering from a mild rose-cold in the early summer, will now have, in addition, an autumnal attack; and, furthermore, patients hitherto suffering merely from the influenza, commence now to suffer, in addition, from hay asthma as well.

It might be stated here, in regard to my own cases, that they are entirely made up of patients in my own private practice, and,

furthermore, that whereas I have reported but eighty, quite a large number are not included, owing to the fact that the recorded histories are incomplete.

GEOGRAPHICAL DISTRIBUTION OF THE DISEASE.—Wyman, in his elaborate treatise on Autumnal Catarrh, has made a special study of the regions of this country where the disease prevails, and of those which are exempt. He found the disease confined mainly to that region of the country east of the Mississippi, between the thirty-fifth and forty-fifth parallels. In this territory the exempt regions consisted of Canada, the Adirondack Mountains, the elevated plateau through the centre of New York, and the Apalachian range. The exempt region consisted of the territory west of the Mississippi, and of those Southern States south of the thirty-fifth parallel, with the exception of a limited area about Milledgeville, Ga., Montgomery, Ala., and Beaufort, N. C. A larger familiarity with the disease, I think demonstrates that Wyman's conclusions were based on insufficient research, and that we will find hay fever prevalent throughout the whole United States, with the exception of certain elevated districts, such as the White Mountains, the Adirondacks and a portion of the Southern States. That patients are exempt from the disease in the mountains, I think is to be explained by the fact that the flora of mountainous districts differs materially from that of the valleys, and that the flowering plants whose pollen is the immediate cause of an exacerbation of hay fever, are not found in those elevated regions. That the disease is comparatively rare in the Southern States, is to be explained by the fact that the morbid conditions of the nasal mucous membrane, which constitute so powerful a predisposing cause of the disease, do not prevail in these semi-tropical regions. That it exists in this region, however, cannot be questioned. However, a few cases are found even in the extreme Southern States, their frequency increasing as we go northward. That the territory west of the Mississippi is to a certain extent exempt, is explained by Beard on the ground of the lack of vegetation, and the sparsity of population in these immense districts. This immunity, however, is disappearing rapidly each year, as there is nothing in the flora or the climate of the West which affords exemption from the disease, for as population extends, and urban life increases, the diseases of civilization become more common.

It is also a noticeable fact, that some parts of the White Mountains, which have hitherto been classed among the exempt regions, have failed in late years to give that complete relief which patients have formerly enjoyed there. This is probably due to the extension of the railroads which have increased the amount of travel,



and as a consequence probably, extended to a degree the flora of the valleys.

DIAGNOSIS.—The disease, it is well known, is not infrequently looked upon as summer cold, and its periodicity overlooked. A mistake in diagnosis, however, need never be made, for there are certain characteristics which distinguish it in a marked way from an ordinary attack of acute rhinitis. These are the comparative suddenness of its onset, as well as its disappearance, together with the peculiar symptoms which characterize its progress, which are the violent sneezing and profuse watery discharge. Now, in an ordinary acute rhinitis, the stage of the disease which is accompanied by a serous discharge from the nose is of comparatively short duration, whereas in hay fever this feature of the disease continues during the whole course of the attack. Moreover, in a cold in the head, intense sneezing lasts but a few days, and does not occur in the violent paroxysms characteristic of hay fever. The appearances of the membrane on examination, moreover, are totally distinct in the two affections. In acute rhinitis the membrane is red, highly congested, and pours forth a more or less profuse mucous or muco-pus discharge, in connection with the serous exudation, which is seen coating its surface in yellowish semi-opaque flakes or masses. In hay fever, on the other hand, the membrane, although swollen, never presents the bright red appearance of an acute inflammation, but is of a bluish-gray tinge, verging on opalescence. This is due to the fact that the hyperæmia is confined entirely to the large venous sinuses which comprise the turbinated bodies, the capillaries of the mucous membrane proper not being congested. In addition to this, the surface of the membrane is covered with slightly viscid watery serum, which gives it a glassy semi-translucent aspect. The swollen condition of the membrane gives rise to more or less complete occlusion of the nasal cavity, the turbinated bodies lying in contact with the septum. At these points of contact, little bridges of viscous serum will be noticed stretching across from one side to the other, giving the appearance of air-bubbles, as it were. Posterior rhinoscopy adds little to our information, other than showing the posterior nares occluded by the swollen grayish membrane covering the turbinated bodies posteriorly. Suffusion of the eyes, with photophobia and epiphora, afford a certain amount of diagnostic information, although those may occur in connection with an ordinary cold in the head.

PROGNOSIS.—Hay fever rarely involves any marked impairment of the general health, and hence the prognosis is never grave. The main question of interest, however, is whether the disease can be cured. It is a noticeable fact in the voluminous literature on this



subject, that this feature of the disease has received but slight consideration. In a certain proportion of cases the disease seems to disappear spontaneously, from no apparent cause. This tendency is, however, manifested in but a small proportion of cases. As before noted, eighty cases have come under my personal observation and treatment, while four additional cases have come under treatment for a diseased condition of the upper air-passages, who had in previous years suffered from annual attacks of hay fever. This perhaps will fairly represent the proportion of cases in which we may expect this spontaneous disappearance of the affection. In discussing the question of causation, eighty cases were analyzed in which the disease was periodical, and the histories fully ascertained. I have, however, comparatively full records of one hundred and twenty-one cases. Of this number there were:

Cured, . . . . .	51
Relieved, . . . . .	43
Unrelieved, . . . . .	13
Results unknown, . . . . .	14

The above tables embrace all the cases of vaso-motor rhinitis that have come under my observation, including not only the periodical cases, such as autumnal fever and rose-cold, but a large number of patients in whom the symptoms were perennial. Roe<sup>1</sup> presents statistics even more favorable than these, in that of forty-four cases under treatment thirty-six were cured, although in sixteen of the thirty-six there was some return of the symptoms.

The question arises, How far can we feel assured in any individual case of accomplishing a successful cure of hay fever? This I think is impossible, as the disease is essentially a treacherous and fickle one, and in those cases which apparently promise the best results, we are often disappointed.

The duration of the disease apparently has no influence on the prognosis, for the case of a year's standing will often prove quite as obstinate to treatment as one of twenty or even thirty years' standing. We would naturally suppose that where hay fever has led to the development of hay asthma, the neurotic habit was so firmly fixed in the individual as to render the prognosis more grave; and yet this is not true, as is shown by an analysis made by the writer of eighty case of asthma.<sup>2</sup> Thirty-four of these cases were hay asthma, and of these eighteen were cured, fourteen relieved, one was lost sight of, and in one, treatment was apparently without effect. The prognosis in hay asthma would therefore seem to be

<sup>1</sup> Trans. Amer. Laryng. Ass'n, 1887, p. 126.

<sup>2</sup> Amer. Journ. of Med. Sciences, Sept., 1888.

more favorable even than in hay fever. Age, I think, has an undoubted influence on prognosis, in that for younger patients a more favorable prognosis can be given.

As before stated, rose-cold seems to affect young people rather than those more advanced in life, hence in a case of rose-cold, the prognosis is more favorable than in a case of autumnal catarrh. We are not warranted, then, in giving an absolutely favorable prognosis in any individual case, and yet I think statistics justify us in the expectation that a large proportion of cases can be cured.

**TREATMENT.**—The treatment of hay-fever consists in:

*First.*—General treatment, for the correction of the neurotic habit.

*Second.*—Local treatment, for the relief of the diseased condition of the upper-air passages.

*Third.*—The treatment of the exacerbation.

*First. Constitutional Treatment.*—The efficacy of internal medication was recognized very early in the history of this disease, and the list of drugs which we find recommended for the correction of the neurotic habit, embraces a large proportion of the so-called nervines as well as many of the anodynes. Among these we include belladonna, zinc, arsenic, phosphorus, strychnine, hydrocyanic acid, valerian, assafoetida, musk, lobelia, amber, the bromides and iodides, chloral, opium, hyoscyamus, quinine, and the various preparations of iron.

The usual method of administration of these drugs is to commence with small doses from two to four weeks before the annual attack sets in, and gradually increasing the dose, to get the patient thoroughly under the influence of the drug by the time the paroxysm comes on, and to continue its administration while the attack lasts. Blackley was a homœopathic physician, but his experiments in the therapeutics of this disease seem to have been quite as thorough as his investigations of its etiology. He obtained excellent results from the use of arsenite of potash and arsenite of quinine, but his best results were obtained from the use of the iodide of arsenic, administered in the form of a trituration containing about  $\frac{1}{100}$  of a grain in a dose. As early as 1828 MacCulloch<sup>1</sup> urged that the disease be treated by anti-periodic measures, and since his time quinine has been quite a favorite remedy, Beard<sup>2</sup> giving this drug the very highest place among therapeutic agents, as having "helped more cases than any other single remedy." Bromides have been extensively used, both for the constitutional habit, and to mitigate the severity of the paroxysms. Few observers, however, have found them to possess any great efficacy, although combined with chloral,

<sup>1</sup> "Remittent and Intermittent Diseases," London, 1828.

<sup>2</sup> Op. cit., p. 158.

their use is not infrequently indicated during the exacerbation, to allay nervous irritability and to produce sleep. Long before the essential pathological lesion which characterizes an attack of hay asthma was recognized, the use of belladonna was resorted to as an anti-spasmodic. Thus we find Laforgue<sup>1</sup> claiming specially good results from its administration in connection with opium, while Dechambre<sup>2</sup> obtained equally good effect from its administration in connection with quinine. Since the disease has been shown to consist in a vaso-motor paresis, I think we must recognize the fact that the efficacy of this drug is due mainly to its peculiar action on the vaso-motor system of nerves. That belladonna exercises a notable influence in controlling the manifestations of this disease has been confirmed by most observers. Dechambre advised that it should be given in gradually increasing doses, until its full physiological effect was obtained, after which the doses should be slowly decreased. This, however, was during the attack. Better results I think are obtained by commencing the administration of the remedy three or four weeks before the attack, and continuing it until its termination. Mackenzie<sup>3</sup> has found "valerianate of zinc in combination with assafœtida more valuable than any other drug." He commences with the administration of one grain of the zinc, in combination with two grains of compound asafœtida pill, before the attack comes on, and at the end of two weeks doubles the dose. I fully believe in the therapeutic value of the salts of zinc in this affection, but regard belladonna as far more efficacious and certain in its action. No combination in my own experience has been attended with better results than the administration of both these remedies as in the following:

℞ Zinci phosphidi, . . . . . grs. viij.

Extract. belladonnæ, . . . . . gr. x.

M. ft. mass. in pill no. xl. div. S. One pill three times a day after eating.

Most cases of hay fever show no evidence of impaired nutrition, but on the contrary I think the rule is that they present every evidence of vigorous general health. Where, however, there is evidence of impaired nutrition, I think the administration of arsenic is often attended with the best of results, and in these cases the above formula can be amended as follows:

℞ Zinci phosphidi, . . . . . grs. viij.

Acidi arseniosi, . . . . . gr. i.

M. ft. mass. in pill no. xl. div. S. One pill after each meal.

<sup>1</sup> Union Médicale, December 17th, 1859.

<sup>2</sup> Gaz. Hebdomadaire, 1860, page 67.

<sup>3</sup> "Hay-fever and Paroxysmal Sneezing," 4th ed., London, 1887, p. 66.



Or, again, in certain cases I have combined the three drugs in the same prescription in the above proportions.

As noted above, most writers tell us to commence the administration of constitutional remedies three or four weeks before the hay-fever season. This is not the time, as a rule, when the patient comes under observation; in fact, I think in most instances they come during the attack, or just after it; and this it seems to me is by far the better time to commence treatment, for, as already intimated, I regard local measures of treatment as of more importance than constitutional. I think, therefore, the time to administer internal remedies for the correction of the general habit, is at the same time in which our local treatment is instituted. The general neurosis which requires correction exists during the whole year, and certainly if the case is one of autumnal fever, the winter or early spring months are quite as favorable to commence treatment as midsummer. If one were to choose the season, however, for treating these patients, I think perhaps the preference might be given to the early summer months, when the warm dry atmospheric conditions are least unfavorable to catarrhal disease involving the upper air-passages. As regards the other drugs of the long list above enumerated, I have but limited experience, and little faith in their value.

There are certain general hygienic measures, which are of undoubted importance, such as the regulation of the clothing, and the habits of life. These have already been sufficiently elaborated in previous chapters. There is, however, one measure which I regard as of the greatest importance. This consists in the use of the cold douche on the spine. A sponge bath is not sufficient. The end to be accomplished is the general tonic effect on the central nervous system, which is produced by the sudden and decided shock of cold water down the spine. The cold shower bath accomplishes the purpose in an admirable manner, and yet this is not always tolerated by the patient. I have rarely, however, seen a patient who could not endure easily the cold douche confined to the spine alone. This plan of treatment is by no means new, for we find Gordon<sup>1</sup> as early as 1829 laying special emphasis on the value of cold baths in these cases. I believe, however, that the spinal douche is of the greater value. The principle on which this acts has been recognized and rather ingeniously explained by Kinnear,<sup>2</sup> who reports six cases of hay fever, in which flattering results were obtained, by the daily application to the spine of Chapman's ice-bags, the ice being kept in position from an hour to

<sup>1</sup> London Med. Gaz., 1829, vol. iv., p. 266.

<sup>2</sup> New York Med. Record, July 14th, 1888, p. 32.



an hour and a half. Kinnear's method secures a longer continued action of the cold, but I am disposed to think equally good results can be obtained by the simple procedure of sitting in a bath-tub, and pressing a sponge full of cold water over the back. Furthermore, I take it, a greater shock is secured by an interrupted application, rather than by a continuous contact.

In this connection there might be noted a rather curious and perhaps somewhat homœopathic experiment of Blackley,<sup>1</sup> who seems to have allowed no possible feature of the disease to escape his experimental investigations. With the view of determining whether invulnerability might not be secured by inoculation, Blackley rubbed some pollen into an abraded surface on the arm. It is needless to state that the results were negative. The above measures of treatment may of course be continued during the exacerbation, with promise of either modifying or controlling the symptoms. Such other treatment as may be required during an attack, is simply that which would be suggested by the general laws which govern the administration of drugs for the control of such symptoms as may be presented. Of these opium is undoubtedly the most valuable, both to allay the nervous irritability, and for procuring sleep. Mackenzie<sup>2</sup> gives preference to the tincture over any other preparation, giving small doses, of from five to seven drops twice daily. This, however, as a rule, should be governed by the tolerance and preference of the patient. In many cases, the best action of the drug would be secured by the hypodermatic administration of morphine, as recommended by Moorhead,<sup>3</sup> who first used in this manner,  $\frac{1}{16}$  of a grain of morphine, with  $\frac{1}{16}$  of a grain of atropia twice daily, but subsequently found his best results from the administration of  $\frac{1}{16}$  of a grain of the tartrate of morphia twice daily, increasing the dose, as the attack developed, to  $\frac{1}{10}$  of a grain three times daily.

Opium undoubtedly does more than control the general condition, in that it goes far to modify the severity of the local symptoms. No physician, however, should take the responsibility of administering to a patient  $\frac{1}{10}$  of a grain of morphia three times daily, through the three months of a hay-fever exacerbation, without recognizing the exceeding great danger the patient incurs of contracting the opium habit. While, therefore, opium is undoubtedly among the most efficacious of our constitutional remedies during an exacerbation, I think it well to depend mainly on less dangerous anodynes, such as hyoscyamus, or the bromides alone or in combination with chloral.

<sup>1</sup> Op. cit., p. 254.

<sup>2</sup> Op. cit., p. 66.

<sup>3</sup> Brit. Med. Journ., 1886, vol. 2, p. 18.

*Second.—Treatment of the Diseased Condition of the Upper Air Passages.*—If the view maintained in discussing the causation of hay fever be correct, that in all cases a powerful predisposing cause lies in a diseased condition of the upper air passages, it necessarily follows that by far the most important feature of treatment consists in the removal of the morbid local lesion. Local treatment of the nose and upper air passages is recommended by most writers on the subject, and yet I think a glance over the literature of the subject impresses one with the idea, that in a large majority of instances the rules laid down for this are exceedingly vague and indefinite. As early as 1837 we find Cazenave<sup>1</sup> recommending in a general way that the nasal mucous membrane be cauterized with nitrate of silver, a plan of treatment which found many advocates up to the time that the use of the galvano-cautery was introduced by Middeldorpf,<sup>2</sup> which soon became the favorite method of cauterization, and we commenced to hear much of the treatment of hay fever by the electro-cautery. Now, we certainly do not treat hay fever by this method, but we treat simply the local morbid lesion which predisposes to it.

The special affections which act as predisposing causes of hay fever are hypertrophic rhinitis, naso-pharyngeal catarrh, deflections of the septum, nasal polypi, and indeed any obstructive lesion in the nose which tends to produce a chronic turgescence of the blood-vessels. When we include naso-pharyngeal catarrh among the local exciting causes of the disease, and as one constituting an obstructive lesion, it is to be understood that we refer to the very intimate and close sympathy which we find existing between the nose and the naso-pharynx, under the action of which, a morbid process in the latter region seems to act as the immediately exciting cause of an hyperæmic condition of the turbinated tissues, this latter being the directly predisposing cause of the hay-fever exacerbation. The special indications for treatment are to be sought by careful investigation and diagnosis of each individual case, and such lesion as may be found is to be treated according to the rules laid down in a previous chapter. If nasal polypi or other tumors are discovered, they should be extirpated; if a deflection of the septum exists, the obstructing portion should be removed. If hypertrophy or chronic hyperæmia are discovered, these conditions should be reduced in the manner already described. In brief, the essential requirements of treatment demand that the whole of the upper air-tract be restored to a condition of normal patency. Sajous,<sup>3</sup> in his interesting monograph, takes the ground that the

<sup>1</sup> Gaz. Médicale, 1837, p. 631.

<sup>2</sup> "Die Galvanokaustik," Breslau, 1854.

<sup>3</sup> Med. and Surg. Reporter, Dec. 22d, 1883.

cauterization of the nasal mucous membrane results in an alteration of superficial nutrition, which renders the membrane invulnerable to the action of pollen. This theory is an ingenious one, but I fail to understand what is meant by an alteration of nutrition. Nutrition is a definite process, and any alteration of it results in a morbid condition. I am disposed to think that the excellent results which Sajous obtained from treatment, were really in subduing turgescence and reducing the hypertrophied membrane. Sajous,<sup>1</sup> writing at a later date, lays special emphasis on the necessity of confining his caustic applications to the sensitive areas, having previously determined these by means of the cold probe, following the method previously described by John Mackenzie.<sup>2</sup> The sensitive areas in the nose described by John Mackenzie,<sup>3</sup> I have never been able to definitely locate as such, and still adhere to the belief that the indications for treatment are the reduction of inflammation and the removal of obstructive lesions, and not the control of a hyper-æsthetic condition in the nose. I think it is a more rational view that the success in treatment undoubtedly obtained by the advocates of the sensitive area theory by means of cauterization, is directly due to a reduction of inflammation and diminution of blood-supply. Certainly the use of the galvano-cautery would scarcely commend itself to us as a proper application for the overcoming of a purely hyper-æsthetic condition of the tissues. Stoker<sup>4</sup> reports a rather unique method of treatment, successful in two cases, in which the caustic was applied "at the junction of the nasal bone with the cartilage of the nose, where the external branch of the nasal nerve passes between these structures to become superficial." I have had no experience with this method, but am disposed to think that the morbid lesion to be controlled is beyond the domain of the nasal nerve.

*Third.—Treatment of the Exacerbation.*—It is a somewhat curious commentary on the correctness of our clinical observations, that although many writers fail to find any benefit whatever from local applications during the attack of hay fever, others advocate, even with a certain degree of warmth, the efficacy of local medication. Thus, Elliottson<sup>5</sup> finds a special efficacy in the local application of the chlorides in solution, directly to the membrane, and also by vaporous inhalations, while Cazenave<sup>6</sup> recommended the irrigation of the parts with weak solutions of corrosive sublimate, as previously suggested by Trousseau. The weight of Helmholtz's<sup>6</sup> great

<sup>1</sup> "Diseases of the Nose and Throat," Phila., 1887.

<sup>2</sup> N. Y. Med. Record, July 19th, 1884.

<sup>3</sup> Amer. Jour. of Med. Sciences, July, 1883.

<sup>4</sup> Annual of the Universal Medical Sciences, vol. iii., p. 269.

<sup>5</sup> London Medical Gaz., 1831, vol. 8, p. 411.

<sup>6</sup> Loc. cit.



name gave considerable popularity to the quinine solutions which he recommended, until De Budberg<sup>1</sup> demonstrated the fact that a solution of chlorate of potassium was equally efficacious. And yet at a quite recent date we find Sir Andrew Clarke<sup>2</sup> claiming most flattering results from the local application of solutions of quinine, carbolic acid, and perchloride of mercury. It is a striking feature of these cases, that the curious psychical condition of mental anticipation is such, that every new remedy is attended at first with a certain amount of relief, which in most instances, however, is but temporary. At one time the use of salicylic acid, as recommended by Binz,<sup>3</sup> obtained a certain amount of popularity, and still later that of boracic acid. None of these remedies probably exercise any special controlling influence on the paroxysm.

The early recognition of the fact that floating pollen in the atmosphere was the exciting cause of the attack, led to attempts to protect the mucous membranes from its impact. Thus we find Blackley<sup>4</sup> testifying to the very great relief afforded by the wearing of a wire gauze respirator, the efficacy of which was increased by moistening the gauze with a weak solution of carbolic acid. As accomplishing the same purpose Mackenzie<sup>5</sup> advises that the nostrils be plugged with cotton wool, although at a later writing<sup>6</sup> he simply suggests that much relief may be afforded, and in certain cases the attack even warded off, by wearing a thick veil over the face. I have never had much faith in the efficacy of these measures, and furthermore the discomfort of wearing a respirator or a thick veil during the whole of the hay-fever season would be so great, that many patients would prefer to risk the exposure to the pollen. No local remedy that has ever been used for the relief of an exacerbation of hay fever is comparable to cocaine, both as regards the certainty and promptness of its action, and the completeness of the relief afforded. The properties of this drug as an anæsthetic were first published in America by Dr. H. D. Noyes, in a letter to the Medical Record<sup>7</sup> in which he gave a detailed account of Köller's great discovery. A few days later, while making use of this agent as an anæsthetic in the nose, I first observed its peculiar action in producing contraction of the blood-vessels. As opportunity afforded, I made use of it in cases of hay fever as well as other nasal disorders characterized by vascular turgescence, and

<sup>1</sup> British Med. Journal, 1881, vol. ii., p. 18.

<sup>2</sup> British Med. Journal, June 11th, 1887, p. 1,255.

<sup>3</sup> Deut. Med. Wochenschr., Sept. 22d, 1877.

<sup>4</sup> Op. cit., p. 260.

<sup>5</sup> "Diseases of the Throat and Nose," Amer. ed., Phila., 1884, p. 310.

<sup>6</sup> "Hay-fever and Paroxysmal Sneezing," London, 1887, p. 61.

<sup>7</sup> New York Med. Record, Oct. 11th, 1884.



found it to give complete relief from all the symptoms for the time, publishing soon after the results of my experience.<sup>1</sup> This action of cocaine in hay fever I attributed purely to its property of contracting the blood-vessels. In subsequent contributions on this subject the view was advocated, notably by Bartholow and Da Costa, that the anæsthetic properties of the drug had much to do with the relief afforded. This view, I think, is hardly tenable, when we consider that a local application of a two-per-cent solution gives such complete relief in from two to four minutes. Now, as we know, anæsthesia only follows an application of a two-per-cent solution of cocaine in about fourteen minutes, whereas contraction of the blood-vessels ensues in from two to four minutes. In other words, the hay fever symptoms abate as soon as the vascular turgescence is allayed. It has been charged, notably by Beverley Robinson,<sup>2</sup> that after the vascular distention has been subdued by cocaine, the relief is but temporary, and is followed by a reaction in which the distressing nasal stenosis is even greater than before. I have used the drug very extensively since its introduction, and recall but three instances in which any such reaction was observed. As before stated, the relief is prompt and efficient, although not permanent, lasting but from two to three hours, when relaxation of the blood-vessels occurs, demanding a second application. The formula which I usually give is as follows:

℞ Cocain. hydrochlorat.,	. . . . .	grs. xx.
Sodii bicarb.,		
Acidi boric,	. . . . .	āā grs. x.
Aquæ,	. . . . .	℥ i.

M. ft. sol.

This is to be used by means of the small hand atomizer shown in Fig. 48 or any small cologne atomizer, such as is sold in the drug-stores. The patient is directed to apply this freely to the nasal cavities as often as may be necessary to control the symptoms. The above solution, as will be seen, is about a four-per-cent solution. It is well to mention this to the patient, directing him to reduce the strength until he finds, what in his own experience, is the weakest solution which may be used and still give relief. In many instances I have found that even a one-half-per-cent solution was quite as efficacious as the preparation given above, and of course it is always desirable that the end should be accomplished with as weak a preparation as possible, as it is well known that the absorption of a drug through the nasal mucous membrane is proba-

<sup>1</sup> "A New Therapeutic Use of Cocaine," N. Y. Med. Record, Nov. 15th, 1884.

<sup>2</sup> Med. Record, October 17th, 1885, p. 425.

bly more prompt than through that of the stomach, hence the constitutional effect of the agent is liable to be experienced; and while I regard cocaine as one of the most harmless of drugs as far as any danger of the cocaine habit is concerned, its excessive use is objectionable in the same manner as the excessive use of tea and coffee, which are apt to render one somewhat nervous perhaps and wakeful. A very nice method of administering cocaine is as follows:

℞ Cocain. hydrochlor., . . . . grs. x.  
 Aquæ, . . . . . q. s.

M. ft. sol.

Adde

Fluid cosmoline vel

Ol. voschano (see page 115), . . . . ʒi.

Shake well before using.

This is to be used in the atomizer shown in Fig. 47. This is perhaps a less convenient form than the watery solution, but the cosmoline affords an exceedingly grateful and soothing application to the mucous membrane, while the cocaine exercises the same action as in the watery solution. Robinson,<sup>1</sup> in reporting cases of hay fever in which cocaine failed to relieve, obtained success from pencilling the nasal mucous membrane with a preparation of one part of carbolic acid to three parts of glycerin, one case being completely cured, while two were notably relieved. I should be disposed to attribute the results in these cases in part, perhaps, to the peculiar anæsthetic properties of the strong preparations of carbolic acid, but mainly to its caustic action. I am confident, however, that the cocaine promises relief in the larger proportion of cases. The main objection to the use of cocaine is not that its use is attended with any unpleasant results, but, it must be confessed, that in a certain proportion of cases it fails to give entire relief. This proportion is very small. In many cases, I think its failure must be attributed to inefficient methods of application, such as by droppers, bougies, etc. Certainly we have no means by which the whole membrane can be medicated with the thoroughness of the spray, and hence the atomizer should be preferred in all cases. Mackenzie<sup>2</sup> recommends the use of gelatin bougies containing  $\frac{1}{10}$  of a grain of cocaine combined with  $\frac{1}{120}$  of a grain of atropine. These are to be inserted into the nasal passages by the patient, and allowed to remain there until they melt. This method of application is uncleanly, and furthermore is not thorough, as I think the application to the middle turbinated bodies is even more important than to the lower, and certainly patients suffering from hay fever

<sup>1</sup> Loc. cit.

<sup>2</sup> Op. cit., p. 62.

would not tolerate the insertion of a bougie into the middle meatus. The same objection, I think, lies against all suppositories of cocaine, as well as the gelatin discs and other preparations of the sort. Insufflations of powders are not open to this objection and are to be recommended as follows:

℞ Cocain. hydrochlorat.,	.	.	.	.	.	grs. x.
Bismuthi subcarb.,	.	.	.	.	.	3 i.
Magnesia carb. lev.,	.	.	.	.	.	3 ij.

M.

Or,

℞ Hydrarg. chloridi mitis,	.	.	.	.	.	grs. v.
Cocain. hydrochlorat.,	.	.	.	.	.	grs. x.
Sacch. lac.,	.	.	.	.	.	3 iij.

M.

The addition of morphine to one of these powders is always grateful to the patient, but a combination of morphine with cocaine should always be used judiciously. Keeping this in view, the following may be used.

℞ Morphinæ tartratis,	.	.	.	.	.	gr. i.
Cocain. hydrochlorat.,	.	.	.	.	.	grs. x.
Sulphuri flor.,	.	.	.	.	.	3 ss.
Sacch. lac.,	.	.	.	.	.	3 iiss.

The only objection to the use of a snuff is that we do not, as a rule, get the same thorough penetration of the nasal cavities, as by means of the atomizer.

Hinkle<sup>1</sup> claims excellent results from the local application of antipyrine alone and also in combination with cocaine. A careful reading of his cases, however, would suggest that his results may have been due to the local effect of the cocaine together with the constitutional effect of the antipyrine, for this drug has been shown by Cheatham<sup>2</sup> as well as by Tyrrell Brooks<sup>3</sup> to possess the property, when administered internally, of notably mitigating the severity of the paroxysm in hay-fever. Jenkins<sup>4</sup> reports a case of hay asthma relieved by the syrup of hydriodic acid administered in teaspoonful doses until relieved.

The ocular symptoms, being due quite as much to the direct impact of the pollen upon the cornea and conjunctiva, as to sympathetic action, are to be relieved by the same local applications

<sup>1</sup> N. Y. Med. Journal, October 20th, 1888, p. 429.

<sup>2</sup> Annual of Universal Med. Sciences vol. iii., 1888, p. 267.

<sup>3</sup> British Medical Journal, May 19th, 1888.

<sup>4</sup> N. Y. Med. Record, vol. xxvi., p. 260.

which are applied to the nasal cavity, although with this proviso, in applying cocaine to the eye, the solution should not be stronger than one per cent. If, however, the eye is well protected by colored glasses, as first suggested by Cazenave,<sup>1</sup> in most instances the relief will be such as to render local applications unnecessary. Cheatham<sup>2</sup> makes the very excellent suggestion that eserine, in the strength of  $\frac{1}{12}$  of a grain to the ounce, should be added to the cocaine solution in order to prevent the dilatation of the pupil.

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<sup>1</sup> Loc. cit.

<sup>2</sup> Medical Record, Nov. 21st, 1885, p. 567.



## CHAPTER XV.

### ASTHMA, OR VASO-MOTOR BRONCHITIS.

ASTHMA is a disease characterized by the diurnal and seasonal recurrence of attacks of dyspnœa, due to an obstruction occurring in the bronchial tubes, in such a manner as to interfere with both the entrance of air to the air-cells, and its exit therefrom, in other words, a dyspnœa both of an inspiratory and expiratory character. The diurnal character of the disease is shown by the recurrence of the attacks at certain times during each twenty-four hours, usually at night, and lasting for some hours, when relief occurs, which may be more or less complete, until the next daily attack comes on. The seasonal character of the attack manifests itself in the disposition of the symptoms to undergo complete relief at certain periods of the year, usually the warm dry months of summer, and in a less degree, the dry, cold months of winter, during which the patient enjoys complete immunity from his diurnal attacks.

ETIOLOGY.—In reviewing the literature of asthma, at the present day, when our knowledge of this disease has become systematized and definite, one is particularly struck with the exceedingly vague and indefinite views which have prevailed in regard to it, up to comparatively recent times, and particularly with the curious theories which have been advanced to account for the symptoms which characterize it; for, while ancient observers could not fail to have their attention prominently attracted to it, by the peculiar character of its manifestations, yet I find that it is rather as a symptom than as a disease, that most writers deal with it. Even as late as 1874, we find Bennett<sup>1</sup> devoting only a few lines to its consideration as a symptom of emphysema and bronchitis, rather than as a distinct disease, while Watson, in his classical work on the "Practice of Physic," although devoting a chapter to the subject, makes the somewhat naïve confession that he has never listened to a case by auscultation. As early, however, as 1852, we find careful observers searching for some rational explanation of the peculiar symptoms which characterize this curious affection. As far as we

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<sup>1</sup> "Principles and Practice of Medicine." American edition, Philadelphia, 1874.

know. Bergson<sup>1</sup> was the first to make it a distinct disease, although its individuality was denied by Rostan<sup>2</sup> and by Beau.<sup>3</sup>

The ancients believed the disease to be due to spasmodic contraction of the bronchial tubes. This view was, however, controverted by Laennec, who cites, as an argument, those cases of asthma in which we have puerile breathing over the entire chest, thus showing that the capacity of the lungs may be increased during a paroxysm rather than diminished. Copeland calls the same cases nervous asthma, while Walshe suggests the term hæmic asthma. Dr. Bree takes a different view, believing the disease due to some specific irritant in the air tubes and that the asthmatic paroxysm is an effort to expel these so-called irritating humors. Beau,<sup>4</sup> whose treatise has already been referred to, believes that all cases develop from a primary bronchitis. Todd<sup>5</sup> regards the disease as humoral, comparing it to gout or rheumatism, and believes that the *materies morbi* affects the respiratory centre; while Budd<sup>6</sup> divides it into two forms; one depending upon cardiac disease, emphysema, etc., the second form due to a spasm of the respiratory muscles. The mere fact that an attack of asthma is always preceded by a feeling of a want of air and increased respiratory effort, is enough to controvert this view. That this view has been held, though, for some time, is shown by the fact that so recent an author as Wintrich<sup>7</sup> advances essentially the same idea.

The first to write a really exhaustive work on asthma was Henry Hyde Salter.<sup>8</sup> His work has become a standard one, and his views have been adopted by most subsequent writers on general medicine. He makes the following propositions:

*First.* Asthma is essentially, perhaps with the exception of a single class of cases, a nervous disease, the nerve centres being the seat of the essential pathological condition. *Second.* The phenomena of asthma, distressing sensation and demand for extraordinary respiratory efforts, immediately depend upon spasmodic contraction of the cells of unstriated muscular fibre in the bronchial tubes. *Third.* The phenomena are excito-motor or reflex actions. *Fourth.* The extent to which the nervous system is involved differs much in different cases, being, in some, restricted to the nervous apparatus of the air-passages themselves. *Fifth.* In a large num-

<sup>1</sup> "Recherches sur l'asthme," 1852.

<sup>2</sup> "De l'asthme;" Gaz. des hôpitaux, No. 31, 1856

<sup>3</sup> "Traité clinique et pratique de l'auscultation," Paris, 1856.

<sup>4</sup> Arch. Générale, vol. 78, p. 155.

<sup>5</sup> Medical Gazette, 1850.

<sup>6</sup> Med. Chir. Transactions, vol. xxiii., London, 1840.

<sup>7</sup> Virchow's "Handbuch der Path. und Ther.," Bd. v., Ab. 1.

<sup>8</sup> "On Asthma; Its Pathology and Treatment," London, 1860.

ber of cases, the pneumogastric, both gastric and pulmonary portions, is the seat of the disease. *Sixth.* In a large class of cases the nervous circuit involves other nerves beside the pneumogastric. *Seventh.* There is still another class of cases in which the irritation is central. *Eighth.* In a certain proportion of cases the irritation is humoral.

We find here that the bronchial spasm theory of the ancients was fully adopted, as the result of large clinical observation and study, and maintained by Salter in the several editions of his popular work. This theory is the one adopted by Biermer<sup>1</sup> also.

We see, then, that, according to Salter, asthma is essentially a neurotic disease, and this theory, with some modifications, is the one adopted at the present day. Dr. Burney Yeo<sup>2</sup> attempts to draw an analogy between the extreme distention of the lungs in asthma and abdominal distention in hysteria. This observation is curious perhaps, but scarcely harmonizes with clinical observation. Morton<sup>3</sup> draws a similar analogy between asthma and spasmodic croup. The sudden nightly attacks, with daily remissions; a certain periodicity observed in the attacks of both diseases; a dry first stage and moist second stage; all seem to him to point to a certain similarity between the two diseases. Another curious observation which he makes, is that the tendency to asthma begins at about the time when the tendency to spasmodic croup ceases. He believes that both croup and asthma are due to disorders of innervation of the larynx, on the one hand, and of the bronchial tubes, on the other; the immediate cause of the paroxysm being excess of venous blood in the medulla. This observation is also incorrect, by the decided error in both premises.

In the diligent research after the hidden causes of disease, so characteristic of the present day, Leyden<sup>4</sup> claims to have discovered certain elements in the sputa of asthmatics, known as "Leyden's crystals," and misnamed, for some reason, Charcot's crystals. Ungar, of Bonn, in an investigation of thirty-nine cases of spasmodic asthma, as recently as 1882, found these crystals in the sputa, but also found that they increased in number the longer the sputa stood, thus, to a certain extent, vitiating Leyden's theory. Quite recently, Dr. Pfuhl<sup>5</sup> relates the case of a soldier whose sputa contained large numbers of the crystals of Leyden, without any evidence of asthma. Furthermore, he has examined the sputa in eight hundred and fifty-five cases of pulmonary disease, and has only found the crystals in the one case mentioned above. An

<sup>1</sup> "Ueber bronchial Asthma," *Sammlung klinischer Vorträge*, 1875.

<sup>2</sup> *London Practitioner*, 1881.

<sup>3</sup> *British Medical Journal*, January 22d, 1877.

<sup>4</sup> *Virchow's Arch.*, Bd. 54, 1871.

<sup>5</sup> *Deutsche med. Zeitung*, 1887, No. 76.



attack of asthma, as we know, consists in the occurrence of more or less well-marked symptoms of oppression of breathing, with a certain amount of periodicity, coming on suddenly, generally at night, and lasting for several hours, the dyspnœa obtaining both during inspiration and expiration, while the cessation of the attack is accompanied by a more or less profuse serous and sero-mucous expectoration. This series of phenomena has been explained by the writers quoted above, on the theory that this dyspnœa is due to the contraction of certain muscular fibres, which anatomists have demonstrated as existing in the bronchial tubes, down to their smallest ramifications. It seems rather curious that this theory should not long ago have been questioned. All observers very properly recognize asthma as a neurotic disease, and muscular spasm is undoubtedly a manifestation of the neurotic temperament, and apparently on this trivial ground, the theory has been accepted. If the paroxysm is due to muscular spasm, why should the attack occur, in most instances, only at night? Why should it be affected by changes in temperature? Why should relief be obtained by high altitudes? Why should an attack be aggravated by a damp atmosphere? There is everything in the repose of a quiet sleep, which should protect one from an attack of asthma, and yet a paroxysm almost invariably comes on during the night. Changes in temperature are not usually recognized as having any marked effect on the nervous system, and yet a change in climate not infrequently precipitates a seizure of asthma. The sea-shore, rather than mountainous districts, is favorable to the toning up, as it is called, of the nervous system, and therefore asthmatics should suffer least at the sea-shore on this theory; yet the converse is true. Again, a paroxysm of asthma is ushered in suddenly, and during its persistence is characterized, it is true, by symptoms which are easily explained upon the theory of spasmodic muscular contraction of the circular fibres of the bronchial tubes, but the culmination of the attack is invariably marked by a more or less profuse sero-mucous exudation, with cough and expectoration. This in no way can be harmonized with the spasmodic theory. I think, then, this view must be abandoned, as failing to explain the clinical history of asthma, or the clinical history of a paroxysm.

In 1872, however, we find the spasm-theory called in question, and what, to my mind, is a far more plausible one advanced by Weber,<sup>\*</sup> who was the first to teach us that the cause of the paroxysm lay in a paresis of the vaso-motor nerves, presiding over the vessels of the bronchial mucous membrane. Under the influence of this vaso-motor paralysis, there occurs, from some cause, a sud-

<sup>\*</sup> Tageblatt der 45ten Naturforscherversammlung zu Leipzig, page 159, 1872.



den letting up of the control which is exercised over the calibre of the blood-vessels, whereupon they become distended to such an extent as markedly to interfere with the passage of air through the bronchial tubes. This paralytic condition having lasted several hours, the membrane maintaining a dry condition, as is always the case in the first stage of the inflammatory processes, there follows an escape of serum and sero-mucus, thus relieving the engorged blood-vessels, which soon regain their normal calibre, coincident with the cessation of the paroxysm. We thus have a thoroughly rational and plausible theory, in explanation of the symptoms of spasmodic asthma. As to the causes, however, of the disease, little has been said, further than the causes already stated, as laid down by Salter. Weber's paper, however, was followed by a series of clinical observations, which largely lent weight to his theory, and also threw much light on the causes of the disease. The first observation of note in this connection was that of Voltolini,<sup>1</sup> who reported a case of asthma due to the existence of nasal polypi, as shown by the fact that the asthma promptly disappeared on the removal of the nasal growths. This observation was followed by a large number of similar reports by Hanisch, Porter, Daly, Toda, Spencer and others, as noted by Mackenzie,<sup>2</sup> and gave rise to voluminous discussions by Schäffer, Fränkel, Bresgen, Hack and others, not only on asthma as a reflex disease due to nasal polypi, but also as due to other nasal disorders.

As before stated, the literature of this subject has assumed large and voluminous proportions, but it still inclines itself to the subject of asthma as a reflex disease. Now, I do not propose to enter into this subject of reflexes, which has always seemed to me as a term oftentimes used as a cloak to conceal our ignorance of the direct relation between cause and effect, but I am convinced that, in very many instances of morbid symptoms occurring as a result of reflex disturbance, we can offer a more rational explanation than "reflex," in the sense in which the term reflex is so often used at the present day. Following Voltolini's observations, that nasal polypus was the cause of asthma, and intimately connected with the same line of investigation, came the study of hay fever. The first impetus, as I think, to this line of investigation, was a paper by Daly.<sup>3</sup> Up to this date, hay fever had been regarded as simply a periodical coryza or influenza, in which the paroxysms were characterized by the same symptoms as are met with in an ordinary cold

<sup>1</sup> "Die Anwendung d. Galvanokaustik," Wien, 1872, p. 246, 4th ed.

<sup>2</sup> "Diseases of the Throat and Nose." American edition, vol. ii., Philadelphia, 1884, p. 357.

<sup>3</sup> Archives of Laryngology, vol. iii., p. 157.

in the head. As a matter of fact, however, acute rhinitis, and an attack of hay fever, differ in a marked way in many respects. This fact was soon recognized, and a new name was given to hay fever, *vaso-motor rhinitis*. We have, thus, suggested a connection between the two diseases, and as a clinical fact, the two diseases are intimately connected; for, as we know, a large number of hay-fever patients suffer from asthma, following soon after the onset of their nasal symptoms. A natural division of cases of asthma into *hay asthma* and *perennial asthma* is thus made, the one term being applied to those cases that are attended with hay fever, the other to those cases in which asthma occurs without reference to seasons, and without the preceding influenza. The question now arises, What, if any, connection exists between the two, or how far are these two diseases one and the same; and, again, what is the connection between hay fever and asthma, and are they not, in many respects, the same disease? In a paper read before the American Climatological Association, May 28th,<sup>1</sup> 1885, I first advanced the view that hay fever and perennial asthma were virtually one and the same disease, the one being a vaso-motor rhinitis, the other being a vaso-motor bronchitis, the paroxysms being excited, in each case, by some peculiar atmospheric condition. The atmospheric condition, as we know, in hay fever is the presence of the pollen of flowering plants, or some other vegetable emanation; whereas the atmospheric condition in perennial asthma, as we may designate those cases of asthma which occur during the whole year, and do not depend upon hay fever, is dependent upon some obscure element which we are, as yet, unable to trace with the same degree of definiteness as we are enabled to trace it in hay fever. Hay fever is dependent upon three conditions:

*First.* A neurotic habit, as was conclusively shown by Beard.<sup>2</sup>

*Second.* The presence of pollen in the atmosphere, as shown by the unrivalled experiments of Blackley.<sup>3</sup>

*Third.* A disordered condition of the nasal passages, as shown by Daly.<sup>4</sup>

Now, the view that I advocate is that asthma also is dependent on three conditions:

*First.* A general neurotic condition, as demonstrated by Salter.<sup>5</sup>

*Second.* A diseased condition of the nasal mucous membrane (not the bronchial).

*Third.* Some obscure condition of the atmosphere exciting the paroxysms.

<sup>1</sup> New York Medical Journal, April 24th, May 1st, 1886.

<sup>2</sup> "Hay-fever or Summer-catarrh," New York, 1876.

<sup>3</sup> "Hay-fever," London, 1873.

<sup>4</sup> Loc. cit.

<sup>5</sup> Op. cit.

The view as regards the neurotic condition is generally accepted; that as regards the atmospheric condition, I think, is one which must be generally accepted by all observers, when we consider the diurnal and seasonal periodicity of the paroxysms. As regards the nasal condition, as a predisposing cause of the attacks, the view is a novel one, and, naturally, would be looked upon as the hobby of a specialist. In my original paper, I made this assertion, that "a large majority, if not all, cases of asthma were dependent upon some obstructive lesion in the nasal cavity. This is evidenced by the immediate relief from the exacerbation, by the use of cocaine in the nose, in every case in which I have tried it, and, futhermore, by the cure of so many cases by the removal of the obstructive lesion in the upper air-passages."

This paper was read two years ago. The views there stated I would repeat with even more emphasis, for subsequent clinical observation has only served to confirm me in my belief of their correctness. That the lesion in a paroxysm of asthma is a vaso-motor paresis of the blood-vessels supplying the bronchial mucous membrane, and not a bronchial spasm, I do not discuss, but accepting this theory as the only one which can explain the symptoms, the question arises, What is the connection between the nasal mucous membrane and that of the bronchial tubes? The subject of the great respiratory functions of the nasal mucous membrane has already been fully treated of in a former chapter, and need not be repeated here. In brief, the most intricate, the most delicate, and most important part of the whole respiratory tract lies in the nose, in that mass of blood-vessels which we call the turbinated tissues, and which serve to supply the inspired air with moisture, by pouring out upon the surface of the mucous membrane a large amount of water—sixteen ounces in the course of the day—by which the inspired air becomes saturated with moisture, this function being necessarily regulated with an extreme degree of nicety of adjustment. This establishes, in what way or through what nerves or ganglia I do not discuss, but to my mind does unquestionably establish, a most intimate connection between the two portions of the respiratory tract. The blood supply in the nose being regulated by the same vaso-motor tract as that which regulates the blood supply of the bronchial tubes, a disturbance in one region is liable to be followed by a disturbance of the other; a morbid condition in one region renders the other especially susceptible to diseased processes. This, briefly, is the history of the connection between the two parts. Hence, we see, therefore, how a diseased condition in the nasal cavity may predispose a neurotic patient, under favorable atmospheric conditions, to an attack of asthma;



the same line of reasoning, as will be noted, being followed here as in the case of hay fever. This connection between the two regions I have not found alluded to by any writers, and yet I cannot but think that Hyde Salter<sup>1</sup> must have entertained a somewhat similar idea, when he says, in speaking of the causation of asthma, that we may divide the cases into two classes: *First*, cases in which the essential cause of disease, "that which constitutes the individual an asthmatic," is some organic lesion, possibly not appreciable, either in the bronchial tubes or some part physiologically connected with the bronchial tubes. *Second*, cases in which the organic lesion does not exist, in which the tendency to asthma is due to something from within, not from without, in which the cause of disease is a congenital and possibly inherited idiosyncrasy. The large clinical observation and study which were the basis of Salter's classical work, could not fail to have impressed upon him, that a diseased condition of the upper air-passages was prominently active among the predisposing causes of asthma. It would seem a rather broad statement to make, that all cases of asthma find their predisposing cause in intra-nasal disease, and yet I am very confident that it is very largely, if not entirely, true. Certainly, in my own observation, I have seen no case in which this could not be stated. The question suggested by Mackenzie<sup>2</sup> here arises, What constitutes a typically healthy nose? Mackenzie seems to think that there is a very large difference in individuals, even in health, and rather suggests that a typically healthy nasal cavity is difficult to find. On the contrary, I think that every nasal cavity, which shows a departure from the normal type, should be regarded as in a diseased condition. The true test, however, in these cases is this: if we find diseased conditions, the removal of which cures an asthma, my proposition, in that individual case, is certainly established. I make the general statement, that all cases of asthma have intra-nasal disease, without giving definite proportions. This may seem rather broad, when we find eminent physicians of the present day, such as Fothergill, Flint, Loomis and others, adhering to the old theory of bronchial spasm, and not mentioning pathological conditions in the nasal chamber as a possible cause of the disease. That my view is by no means entertained by laryngologists, is shown by the fact that Böcker<sup>3</sup> makes the statement that asthma is seldom associated with polypi, and seldom cured by their removal, and that hay asthma is caused by direct irritation of the bronchi, and, further, that, normally, asthma cannot be produced in the nose.

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<sup>1</sup> Op. cit., page 81.

<sup>2</sup> "Hay-Fever," London, 1885, p. 25.

<sup>3</sup> Deutsche medicinische Wochenschrift, 1886, Nos. 26 and 27.



This first assertion of Böcker seems to me to be a very grave reflection on his skill as an operator. In the *Union for Internal Medicine*, May and July, 1886, Lublinski, Heyman, Böcker and Krause assert that, in many cases, asthma is independent of a pathological condition of the nasal passages. Schech,<sup>1</sup> however, states that, in sixty-four per cent of cases of asthma, he found intra-nasal disease, and further adds that there must be associated with it excessive nervous irritability—in other words, the neurotic habit.

In looking over my notes, I find I have recorded histories of eighty cases of asthmatics treated during the last five years. Not satisfied with the study of these records, and in order to make my investigation as thorough as possible, and, at the same time, bring the reports up to date, I mailed to each one of these patients, some of whom I had not seen for a considerable time, a printed circular, in which I propounded a series of questions. These questions I will not recapitulate, as they are suggested by the headings in the following analysis of my tables. The last question was, "Please state candidly and without favor, what benefit, if any, you have received from the treatment, and to what you attribute your improvement or cure." The following analysis sets forth the result:

Total number of cases of asthma,	. . . . .	80
Males,	. . . . .	47
Females,	. . . . .	33
Hay asthma,	. . . . .	34
Males,	. . . . .	26
Females,	. . . . .	8
Perennial asthma,	. . . . .	46
Males,	. . . . .	21
Females,	. . . . .	25

#### PERENNIAL ASTHMA—FAMILY HISTORY.

Clear in,	. . . . .	9
Neurotic,	. . . . .	3
Bronchitis and asthma,	. . . . .	2
Asthma,	. . . . .	4
Asthma and hay fever,	. . . . .	4
Bronchitis,	. . . . .	2
Asthma, bronchitis and neurosis,	. . . . .	1
Phthisis,	. . . . .	1
Hay fever,	. . . . .	1
Asthma and neurosis,	. . . . .	1
Unknown,	. . . . .	18
Total,	. . . . .	46

<sup>1</sup> Münchener medicinische Wochenschrift, 1887, Nos. 40 and 41.

HAY ASTHMA—FAMILY HISTORY.

Asthma in, . . . . .	14
Clear in, . . . . .	5
Phthisis and neurosis, . . . . .	1
Neurotic, . . . . .	2
Hay fever, . . . . .	2
Asthma and neurosis, . . . . .	2
“ “ hay fever, . . . . .	2
“ “ neurosis and hay fever . . . . .	1
Neurosis and hay fever, . . . . .	1
Unknown, . . . . .	4
Total, . . . . .	34

The prominent feature shown here is the large preponderance of cases which show a decided neurotic family history; twenty-five of the thirty cases of hay asthma being of inherited neurotic habit, where the history is known, while in the perennial form sixteen of the twenty-eight cases, in which the history is ascertained, show the neurotic tendency.

Age of First Attack.	Perennial Asthma.	Hay Asthma.
1st ten years of life, . . . . .	5	5
2d “ “ “ . . . . .	9	7
3d “ “ “ . . . . .	12	11
4th “ “ “ . . . . .	6	6
5th “ “ “ . . . . .	5	4
Over fifty years of age, . . . . .	8	1
From birth, . . . . .	1	...
Total, . . . . .	46	34
Average age of first attack, . . . . .	29 years.	24 years.
Oldest case, 72 years; youngest, congenital.		

We notice that the tables show that the largest number of cases of asthma, in both forms, develop during the third decade of life, while no period is notably exempt. This differs from Salter, who states that most cases develop during the first decade.

CLIMATIC INFLUENCE ON HAY ASTHMA.

Greatest relief at high altitude, . . . . .	11
“ “ “ low “ . . . . .	1
“ “ “ sea “ . . . . .	6
“ “ in New York City, . . . . .	3
Suffer equally everywhere, . . . . .	3
Unknown. . . . .	10
Total, . . . . .	34

## CLIMATIC INFLUENCE ON PERENNIAL ASTHMA.

Greatest relief at high altitude, . . . . .	11
Suffering more " " . . . . .	1
Greatest relief at sea, . . . . .	2
Suffering more " " . . . . .	7
" " equally everywhere, . . . . .	12
Greatest relief at low altitude, . . . . .	1
" " in New York City, . . . . .	1
Unknown, . . . . .	11
Total, . . . . .	46

Combining these two tables in one we find as follows:

## CLIMATIC INFLUENCES ON THE TWO FORMS OF ASTHMA.

Better at high altitudes, . . . . .	22
" at sea shore, . . . . .	8
" in city, . . . . .	9
Unaffected by locality, . . . . .	13
Irregular, . . . . .	9
Effect of locality unknown, . . . . .	19
Total, . . . . .	80

We notice here, that whereas, in hay fever, the seashore affords the greatest relief, after asthmatic symptoms set in, the same rule applies to both forms, and that high altitudes are most beneficial; and yet, I think, no rule can be formulated for the cases as a class. They are essentially fickle, and each one must be advised from personal and individual considerations.

## HAY ASTHMA.

Nasal symptoms immediately preceding attack, such as sneezing with watery discharge from the nose, . . . . .	29
No symptoms preceding attack, . . . . .	5
Total, . . . . .	34

## PERENNIAL ASTHMA.

Nasal symptoms preceding attack, . . . . .	33
No nasal symptoms preceding attack, . . . . .	12
Cutaneous eruption preceding attack, . . . . .	1
Total, . . . . .	46

This showing, it seems to me, is of the greatest importance, as sustaining the original assertion made in the early portion of the chapter.

It should be mentioned that many patients entirely ignore the



nasal symptoms, in the larger discomfort arising from the dyspnoeic attack, and only recall them, when their attention is turned in that direction. We see, then, that, of the eighty cases, the asthmatic attack set in with sneezing, etc., in sixty-two.

The one case in which a cutaneous eruption occurred is interesting only with reference to the neurotic explosion.

HAY ASTHMA.

History of previous catarrhal trouble, . . . . .	23
No history of previous catarrhal trouble, . . . . .	11
Total, . . . . .	34

PERENNIAL ASTHMA.

History of previous catarrhal trouble, . . . . .	31
No history of previous catarrhal trouble, . . . . .	15
Total, . . . . .	46

We see here that, of the eighty cases, fifty-four give a history of previous catarrhal trouble. Yet the testimony of patients in this matter is not to be relied upon, as many patients have undoubtedly notable impairment of the nasal respiratory function, without being conscious of suffering from what they call catarrh. Moreover, in a large proportion of nasal disorders, the symptoms are referred, by the individual, to the throat, while "catarrh" is popularly referred to the nose.

INTRA-NASAL CONDITION—HAY ASTHMA.

Hypertrophic rhinitis, . . . . .	9
" " and deflected septum, . . . . .	12
Polypi and deflected septum, . . . . .	5
Polypi, . . . . .	4
Deflected septum, . . . . .	3
Elongated uvula, . . . . .	1
Total, . . . . .	34

INTRA-NASAL CONDITION—PERENNIAL ASTHMA.

Hypertrophic rhinitis, . . . . .	13
Nasal polypi, . . . . .	11
Hypertrophic rhinitis and deflected septum, . . . . .	11
Polypi and deflected septum, . . . . .	6
Deflected septum, . . . . .	3
Adenoid and hypertrophic rhinitis, . . . . .	2
Total, . . . . .	46

I have never known a case of hay fever or asthma to occur in other than an obstructive lesion of the nose or upper air-passages,



I have thus given all the results obtained from the analysis of my cases, as bearing not only on etiology, but also on other branches of our subject. The point upon which I wish to lay special emphasis here, is the very close and intimate physiological and pathological connection between the nasal mucous membrane and that lining the bronchial tubes, and the further fact, that in asthma we must look for the active predisposing cause of the attack, in a diseased condition of the nasal mucous membrane. In the above statistics, we have included hay asthma and perennial asthma, considering these two affections as virtually one and the same disease, from a clinical point of view. This is shown by the fact, that, in many instances, they are interchangeable, in that a patient may suffer a number of times from hay fever, without developing asthmatic attacks; finally, however, his hay-fever paroxysm winds up with an attack of true nervous asthma, a still further change consisting in the cessation of the hay-fever attacks, and the patient becoming subject merely to attacks of perennial asthma. This fact I have noticed in quite a number of instances. Why, then, do we regard an intranasal disorder as a prominent factor in the causation of a paroxysm in the large majority of cases? It is not intended to convey the idea, that this condition may alone be responsible for an attack of this disease. Thus, it cannot be questioned that, in many instances, cardiac disease is to be regarded as a prominent factor of causation, as well as renal disease, or gastric disturbance; and of the more remote causes, we must recognize the presence of worms in the intestinal canal, uterine disorders, an overloaded stomach, etc. Chronic bronchitis is ordinarily recognized as one of the causes of asthma. This I think is not to be placed in the same category. In this affection, the chronic morbid process of the bronchial mucous membrane develops a relaxation of blood-vessels, which ultimately leads to attacks somewhat resembling an ordinary attack of nervous asthma, and yet I think the two things should not be confounded; the form of disease which we are now discussing being a totally different disease, I take it, from that which occurs in connection with bronchitis, and this should therefore be excluded from consideration here.

As regards those remote causes, then, I think we must recognize the fact, that even here there must be, in many cases, some local disorder of the nasal cavities, which leads to the development of the reflex disturbance; otherwise, the presence of worms in the intestinal canal, or other disturbing influences, would scarcely result in the development of an attack of asthma. We have already shown the intimate physiological connection between the nasal mucous membrane, and that of the bronchial tubes, and that a weakened

condition of the passages above, tends to develop a similar condition in the parts below. I think, therefore, we must recognize, in all these unusual reflexes, this tendency to vaso-motor weakness of the bronchial tubes, under the action of which, worms in the intestinal canal, undigested food in the stomach, and other causes, may produce an asthmatic attack. We find it often stated, that a paroxysm is precipitated by flatulent distention of the bowels; indeed a number of such cases have come under my own observation, but in no single instance has such a case been observed, in which there was not abundant evidence of the reflex disturbance having been directed to the bronchial mucous membrane, by a local lesion in the nasal cavity. In other words, wherever we have had, what appeared to be an attack of asthma brought on by flatulent distention, I have been convinced that the paroxysm was really excited by nasal polypi, hypertrophic rhinitis, or some other lesion of the nasal passages, and the flatulence was either an adventitious symptom, or possibly a complicating circumstance, which precipitated the asthmatic attack. Perhaps it would be not wise to say that a pathological intra-nasal condition is present in every one of these cases of obscure reflexes, and yet I think it is still less wise to accept evidence of cardiac lesion, or gastric disturbance, as presenting a sufficient cause of the attack, without also examining the nasal cavities, to ascertain whether some lesion may not also exist there.

The disease being essentially a neurosis, we would naturally expect to find heredity exercising a notable influence, a fact which all statistics fully bear out, in that this disease, as well as hay fever, seems to run in families, as it were. The influence of age and sex has already been clearly shown, in the statistics before given. The possible existence of a rheumatic or gouty diathesis should of course not be overlooked, as factors in the development of these attacks. How they should act, it is impossible to say, and yet here, as before, I think still the possible existence of a predisposing nasal disorder should not be overlooked. We regard, then, an intra-nasal disorder as not only a powerful predisposing, but exciting cause of an attack of asthma. It should be stated, however, that when we speak of pathological intra-nasal conditions, we include not only a diseased condition of the nasal cavity, but also of the naso-pharynx. Among these, we may enumerate as the most prominent, hypertrophic rhinitis, deformities of the septum, nasal polypi or other tumors, adenoid tumors of the vault of the pharynx, and naso-pharyngeal catarrh. How this latter affection acts, it is not easy to state definitely. As we all know, it is dependent, in no small degree, upon a diseased condition of the nasal cavities proper, and on the other hand, as Tornwaldt has so clearly shown us, it may give rise



to a turgescence of the turbinated tissues. We have, therefore, really here two morbid conditions which react the one upon the other, in such a way as to leave us somewhat in the dark as to which is the more active. However this may be, the clinical fact remains, that they both exercise a notable influence in producing that peculiar weakness of vaso-motor control over the blood-vessels of the bronchial mucous membrane, which leads to the development of an attack of asthma.

It will be noticed that, in the tables previously given, nasopharyngeal catarrh was not included among the causes of the disease. This was present in a number of cases, but is to be regarded as a somewhat secondary cause, in that the vaso-motor paresis which constitutes an asthmatic attack is more intimately associated with disturbances of circulation in the turbinated bodies, and when nasopharyngeal catarrh was present, it was regarded as either due to the intra-nasal disease, or as a cause of it.

SYMPTOMATOLOGY.—A paroxysm of asthma usually occurs at night, and perhaps, in the majority of instances, during sleeping hours. A patient retires without any premonition of danger, and after sleeping a few hours, is awakened by a most distressing dyspnoea, or feeling of suffocation. He springs up from his bed terrified, alarmed, and gasping for breath. His face is turgid, eyes protruded, mouth open, with the perspiration starting upon his face. The dyspnoea is both inspiratory and expiratory; inspiration being shorter and somewhat quicker, in that it is aided by all the voluntary and involuntary muscles of respiration, while the expiration is somewhat prolonged, in that the patient apparently seeks a momentary period of rest, in allowing such air as he has drawn into the lungs, to escape voluntarily. Whereas the dyspnoea characterizes both acts of inspiration and expiration, the muscular struggle is largely expended on the inspiratory act. The patient is apt to be somewhat restless in his movements, in search of some position which will afford relief, a search which is usually disappointed, although the greatest ease is ordinarily obtained in the semi-recumbent position. Not infrequently, when the attack is severe, the distress is so great that the patient springs from the bed, and rushes to the window in search of air. The pulse is ordinarily somewhat rapid and weak, especially if the paroxysm is prolonged. The temperature usually falls somewhat below the normal, due probably to the fact of insufficient oxygenation. This represents a typical and well-developed attack of asthma, which may last for one to two, three or four hours, and in rare cases may persist from one to three days. In other cases, the attack presents a somewhat milder type, in that the dyspnoea is by no means so great, and the par-

oxysm is simply characterized by oppression of breathing, and persists for a few hours or a day, in which the patient experiences mere discomfort, rather than actual suffering. When the paroxysm comes on during waking hours, in the large majority of instances, it commences with sneezing and watery discharge from the nose, which may be of such a character as to give considerable annoyance to the patient, or be so slight as to scarcely excite attention.

In that form of asthma which occurs in connection with hay fever, of course, the attacks are confined only to the hay-fever season, but in the ordinary form of asthma, which we have already designated as perennial, the attacks are usually aggravated by the damp atmosphere of the spring and fall, the patient enjoying a certain degree of immunity during the clear cold weather of winter, and the warm weather of summer. During the damp season, however, the attacks usually occur about the same time each day. During the intervals, the patient enjoys almost complete immunity, although even now, a careful examination of the chest will reveal evidences of contraction of some of the bronchial tubes, as shown by the sibilant and sonorous râles on deep inspiration.

The character of the paroxysm is also notably influenced by the changes in weather, in that the attacks are much less severe during the pleasanter days of the spring and fall months. Moreover, in the midst of the bad season, the attacks may be arrested by a change to a dryer climate, especially to high altitudes, where an atmosphere is encountered which seems exceedingly favorable in its influence upon these cases. In most of these patients, also, a peculiar hyperæsthetic condition of the whole upper air-tract is present, evidenced by the fact, that the presence of irritating vapors, dust, gases, etc., will produce a temporary sense of dyspnoea, or even a well-marked paroxysm of asthma; which, however, usually disappears promptly on the removal of the exciting cause. The cessation of the paroxysm is usually attended with a more or less profuse sero-mucous discharge, the clinical significance of which has already been fully discussed, in the statement that this was due to the unloading of the engorged blood-vessels by a serous exosmosis, by means of which their calibre is diminished, and thereby the patency of the bronchial tubes restored.

PHYSICAL SIGNS.—On inspection of the chest during a paroxysm, the first noticeable feature will be, the very marked impairment of motion, in that the whole chest-wall seems somewhat rigid, and to move together. This, however, is, to an extent, deceptive, the limited movement of the chest being really due to the limited amount of air which is drawn in, with each act of inspiration. Percussion simply reveals perhaps a slight exaggeration of normal

resonance. The diagnosis, of course, is based entirely on auscultation, by means of which there will be recognized the characteristic sibilant and sonorous râles throughout the whole of the chest cavity, and heard equally at any point. These are blowing, purring, whistling, cooing sounds, that are caused by the passage of air through the narrowed tubes of various calibres, the walls of which are perfectly dry. In other words, there is total absence of any moisture, but the mingling of dry râles constitutes a confusion of musical sounds, as it were, which can be likened to nothing so much as the cooing of a bevy of pigeons. So loud are these sounds, that they can be heard frequently even across the room. The normal respiratory murmur is of course completely masked by these loud râles, which are heard both in inspiration and expiration, although, as before stated, the expiratory sounds are somewhat prolonged. At the termination of the paroxysm, the dry râles diminish in intensity, and to an extent disappear. The moist râles may now be heard, as the serum transudes the blood-vessels, and makes its appearance in the bronchial tubes.

DIFFERENTIAL DIAGNOSIS.—It scarcely seems necessary to suggest any points of differential diagnosis, and yet there might be a possibility of mistaking an attack of asthma, for spasm of the glottis, hydrothorax, œdema of the lungs, and cardiac disease. In laryngeal spasm, the voice would necessarily be affected, and the dyspnœa would be entirely of an inspiratory character, and its locality recognized by the peculiar sub-clavicular and sub-sternal depression, which would characterize each inspiratory act. Moreover the impairment of voice would give further evidence of the laryngeal disorder. In angina pectoris, and hydrothorax, there would be of course no sibilant or sonorous râles. The same is true also of pulmonary œdema, which also is characterized by moist râles, and more or less profuse serous expectoration. In the dyspnoïc attacks of cardiac disease, there is an entire absence of the characteristic sibilant and sonorous râles.

PROGNOSIS.—Asthmatic patients are said to be long-lived, which is probably true, in that there is nothing in the disease itself which would tend to shorten life. During attacks, the sufferings of the patient are extreme, but during the intervals, he enjoys ordinarily the best of health, excluding, of course, those cases which are dependent upon a chronic bronchitis, which, as before stated, is not to be classified with nervous asthma. As regards the disease itself, however, the prognosis, of course, depends largely on our ability to control it. From the analysis of cases given above, it would seem that the plan of treatment there carried out, affords us a method of controlling the severity of attacks, in the large majority of instances,



and in a very flattering proportion of cases, of radically curing the disease. As regards any tendency to recover unaided by therapeutic efforts, this would seem to exist in but a small degree, although in many cases, especially in youth, the disease seems to disappear without treatment. The longer, however, the attacks have lasted, the less tendency there is for the spontaneous cure. Moreover, it is probably also true, that the longer the attacks have existed, the less amenable they are to treatment.

TREATMENT.—The consideration of the treatment of this disease naturally divides itself into three heads, namely:

1. The treatment of the local predisposing cause, which, as we have endeavored to show, consists of a morbid condition of some portion of the upper air-tract.

2. The treatment of the paroxysm.

3. The constitutional treatment, or the treatment of the general neurotic habit.

*The Treatment of the Local Morbid Condition in the Upper Air-passages.*—We place this first in importance, in that, as has already been intimated, we regard these measures, not only as the first to be instituted, but as those which promise the best and surest results, and even in those cases where local treatment fails to thoroughly relieve the disease, we certainly have prepared the way for the better action of general remedies. In resorting to these local remedies, we search not only the nasal cavities, but the cavity of the naso-pharynx, for the local predisposing cause, but of these two, the measures of treatment are to be first directed to the nasal passages proper, in that, as has already been intimated, we find in the large proportion of cases, that the morbid condition of the naso-pharynx disappears upon the restoration of the nasal passages to a healthy condition of patency, and its lining membrane to a normal condition of functional activity. These measures failing to give relief, treatment must be directed to the naso-pharynx, according to such indications as present, in the manner to be discussed at length in a subsequent chapter. The conditions which we may encounter in these regions which demand treatment, may be briefly enumerated as follows: hypertrophic rhinitis, deformities of the septum, nasal polypi or other neoplasms, chronic naso-pharyngeal catarrh, adenoid growths or other tumors in the vault of the pharynx, or in fact any condition of the nose or naso-pharynx which constitutes an obstructive lesion.

*The Treatment of the Paroxysm.*—I have endeavored, in a former chapter, to make clear the intimate sympathy which exists between the nasal and bronchial mucous membrane, and to show how a plethoric condition in one region, is exceedingly prone to be ac-



accompanied by a similar condition in the other. Now, if, as I think has been clearly demonstrated, a paroxysm of asthma consists essentially in a turgescent condition of the blood-vessels of the mucous membrane lining the bronchial tubes, which turgescence is prone to be accompanied by turgescence of the nasal mucous membrane, it is easy to understand how the local application of any remedy to the nasal passages, which will control vascular dilatation in this region, should result in either marked arrest or the complete relief, for the time being, of the asthmatic paroxysm. A large clinical experience, has shown this observation to be correct, and hence probably we possess few remedies more active or more certain in their action than cocaine. This, therefore, should be our first resort. It may be applied by means of the small atomizer, shown in Fig. 48, or failing this, an ordinary dropper answers an excellent purpose, a small amount being applied to each nostril, and repeated every five minutes, until relief is afforded. In my own hands, I have seen but few cases in which this remedy was not notably successful.

Next in importance to this, we should place *datura stramonium*, the efficacy of which we find recorded in the early part of the century. Thus Christie<sup>1</sup> reports it as having been used with good results, as early as 1805, while similar observations were made by English<sup>2</sup> and other writers.<sup>3</sup> This drug is used by burning the leaves and inhaling the smoke, this procedure being accomplished by smoking the leaves in a pipe, or in the form of a cigarette, or simply by burning them on a plate. What the action of the drug is, it is difficult to state, other than on purely speculative grounds. Clinical experience, however, teaches us that the fumes of the leaves have a very powerful effect in controlling the distressing features of an asthmatic paroxysm, and, although probably, in the majority of instances, they fail to afford perfect and entire relief, they rob the attack of much of its distressing character.

Another remedy of great efficacy is the fumes of burning saltpetre. This was first reported, I believe, by Harrison,<sup>4</sup> who obtained the remedy from a friend, who found notable relief in saturating paper in a strong solution of nitrate of potash, and then setting it on fire, and inhaling the fumes, having previously allowed the paper to dry, whereby the solids were deposited upon it, the object of the paper being simply to produce ignition of the potash salt. While, perhaps, not as efficacious as the *stramonium*, the saltpetre

<sup>1</sup> Edinburgh Med. and Surg. Jour., 1811, vol. vii., p. 158.

<sup>2</sup> Edin. Med. and Surg. Jour., 1811, vol. vii., p. 277.

<sup>3</sup> Med. Repository, 1812, vol. iii., p. 311.

<sup>4</sup> Lond. Lancet, 1845, vol. i., p. 383.

is a remedy which rarely fails to afford a certain amount of relief. The combination of these two remedies is one which enters largely into the manufacture of a large proportion of the asthma remedies sold in the drug-stores. Thus Himrod's powder is composed of the leaves of lobelia inflata, datura stramonium and ordinary tea, mixed with a certain proportion of nitrate of potash, while the "Green Mountain Cure" is composed of the same drugs, in somewhat different proportions. Probably no combination of these remedies is more effective than the following, from the Brompton Hospital Pharmacopœia:

℞ Pulv. stramonii,	. . . . .	3 iv.
Pulv. anisi,		
Potas. nitrat.,	. . . . .	āā 3 ij.
Pulv. tabaci,	. . . . .	grs. v.

These powders may be burned on a plate, or smoked in an ordinary clay pipe.

Still other remedies, which possess a certain amount of popularity for use in this manner, are: datura tatula, datura fatuosa, metêl, belladonna, opium, hyoscyamus, arsenic, etc. These, however, are usually used in combination with the stramonium and potash, as in the well-known Espic's cigarettes, the formula of which is as follows:

℞ Fol. belladonnæ,	. . . . .	grs. vss.
Fol. hyoscyami,		
Fol. stramonii,	. . . . .	āā grs. ij $\frac{3}{4}$ .
Fol. phellandrii aquatici,	. . . . .	gr. i.
Extract. opii,	. . . . .	gr. $\frac{1}{8}$ .
Aquæ lauro-cerasi,	. . . . .	q. s.

This is a very efficacious combination, and is also an exceedingly convenient method of obtaining the fumes of these drugs. Chibrac<sup>1</sup> reports a case of a man, who obtained notable relief from the inhalation of the fumes of carbonic acid, obtained from a charcoal brasier, while Julius<sup>2</sup> reports the case of a patient, who obtained relief by smoking cigarettes containing quarter of a grain of white arsenic, although she was compelled to gradually increase the dose up to three grains, on account of a certain tolerance produced. This, I believe, is a plan practised among the Chinese. I have no experience with either carbonic acid or arsenic, but should hesitate to make use of either method; certainly, the latter is open to serious objections. It is a curious feature, in the clinical history of asthmatics, that the efficacy of every remedy seems to exhaust

<sup>1</sup> Union Médicale, 1879, vol. xxviii., p. 617.

<sup>2</sup> Lancet, 1861, vol. ii., p. 138.

itself, to a certain extent. This is not due, I think, to any tolerance produced by the drug, but rather to the fact, that the longer the disease lasts, and the more fixed the asthmatic habit becomes in an individual, the greater the difficulty in affording relief to a paroxysm. In other words, the morbid lesion which constitutes a paroxysm, being a relaxation of the blood-vessels, their tonicity or power to re-contract seems to be lessened, according as the disease persists for a lengthy period of time. Hence, any of the above simple remedies may occasionally fail to afford relief, and it will become necessary to resort to internal medication. Of internal remedies, undoubtedly the most efficacious is opium. This should be administered, where necessity demands, in the form of morphine, and given hypodermatically, as securing the promptest effect of the drug, and in doses of one-eighth to one-sixteenth of a grain, repeated hourly, until relief is afforded. This remedy has undoubtedly been in use for a number of years, and yet curiously enough, we find no allusion to it in literature until Levi<sup>1</sup> reported notably good results from the hypodermatic injection of morphine, while subsequent observations of a similar character were made by Lessdorf,<sup>2</sup> Anderson,<sup>3</sup> and Oliver.<sup>4</sup> The latter, however, recommended, that it be combined with one one-hundredth of a grain of atropia. Under the theory that an asthmatic paroxysm is due to muscular spasm, morphine was administered for the purpose of relaxing muscular contraction. This theory being faulty, we must seek for the beneficial action of the opium in its general sedative action upon the nervous system, and perhaps, also, in a certain amount of sedative influence which it exerts upon the circulation. In much the same way we explain the action of chloral, the efficacy of which was long since recognized. According to Williams,<sup>5</sup> this is best administered in doses of fifteen to twenty grains, repeated every three hours, until sleep is produced, or in twenty to thirty grain doses, repeated once or twice during the night. The advantage of combining this drug with bromide of potassium, as suggested by Lamadrid,<sup>6</sup> is recognized by all, and hence to each dose of the chloral we may add an equal amount of the bromide. If the paroxysms be very severe, we may resort to the administration of chloroform, as was recommended as early as 1849 by Birdsall,<sup>7</sup> or of ether, as recommended by Willis,<sup>8</sup> although these remedies should be used with a certain amount of hesitation, and with the anticipation of giving but tem-

<sup>1</sup> Gior. Veneto di Sc. Med., Venezia, 1866, 3d series, vol. iv., p. 603.

<sup>2</sup> Deut. Klin., 1871, vol. xxiii., p. 15.

<sup>3</sup> Practitioner, 1875, vol. xv., p. 321.

<sup>4</sup> Practitioner, 1876, vol. xvi., p. 137.

<sup>5</sup> Brit. Med. Jour., June 13th, 1874, p. 772.

<sup>6</sup> Phila. Med. Times, 1874, vol. iv., p. 760.

<sup>7</sup> Lancet, 1849, vol. i., p. 336.

<sup>8</sup> Lond. Med. Gaz., 1847, n. s., vol. iv., p. 271.



porary relief. The latter is especially objectionable, on account of its peculiar irritating action upon the mucous membrane of the upper air-passages. When Duncan<sup>1</sup> first suggested the use of nitrite of amyl, its use was resorted to with a considerable degree of enthusiasm, as it seemed to give most excellent results, although subsequently it has fallen into disuse, on account of the very distressing symptoms referable to the head to which it gives rise. In the same category we may place the iodide of ethyl, recommended by Sée.<sup>2</sup>

In former times, I found excellent results, in many instances, from counter irritation applied to the spine, either in the form of a mustard plaster, or a blister from two to four inches square, over the fourth and fifth dorsal vertebræ. This of course is somewhat objectionable, and in view of the prompt action of the remedies first noted, I have not resorted to this measure in recent years. Probably better and prompter action would be obtained from applying cold to the spine, either in the form of an ice-bag in the same region, or perhaps better still, the long Chapman's ice-bag, over the whole of the spine, its action being probably much the same as that experienced by its use in hay-fever cases, as recommended by Kinnear.<sup>3</sup> The use of the galvanic current has been recommended for the relief of the asthmatic paroxysm by Caspari,<sup>4</sup> and it is an excellent suggestion, although scarcely available in most instances. We have thus given, somewhat in the order of preference, the various measures to which we may resort, in our attempts to relieve the paroxysm, all of which undoubtedly possess notable merit, and yet, as a rule, I think we shall find, in most instances, the best results from the simple measures first enumerated, notably the local application of cocaine, and the inhalation of the fumes of stramonium and nitrate of potash, in some one of their various combinations.

*General Treatment.*—While I believe the local treatment of a diseased condition of the air-passages the most important part of our therapeutic measures, none will question the marked effect of the internal administration of drugs, in this disease. Hence I think we are rarely justified in depending entirely on local measures alone, but when our patients first come under observation, they should be immediately put on a course of internal medication also. Of internal remedies, the one which experience has shown us to possess the most notable efficacy in the control of asthma, is undoubtedly iodide of potassium. Its value in this disease was recognized very soon after

<sup>1</sup> Mich. Univ. Med. Jour., 1872-3, vol. iii., p. 588.

<sup>2</sup> Gaz. Méd. de Paris, 1878, 5th series, vol. vii., p. 79.

<sup>3</sup> Loc. cit.

<sup>4</sup> Wien. Med. Woch., 1868, vol. xviii., p. 333.



its first discovery. Casey<sup>1</sup> found excellent results from the administration of from two to five grains, three times daily, while Deane<sup>2</sup> found it of value, administered in doses of from two to five grains every two hours, as controlling the severity of the paroxysm. Subsequent to this, we find a number of similar observations in literature, with no very specific directions for its systematic administration until Sée<sup>3</sup> suggested a definite plan for its administration, in following which, I am disposed to think, we will obtain our best results. He commences with the administration of ten grains, well diluted in wine or water, which is to be given three times daily, after meals, for from five to seven days, after which he doubles the dose, and continues it for an equal period. This latter dose usually produces iodism, as evidenced by the metallic taste in the mouth, when he reduces the dose to seven grains, three times a day, for a somewhat long period of time, occasionally interrupting its administration for a day or two, but still continuing to give it for a prolonged period, or until its efficacy has been thoroughly tested. As regards other remedies, such as lobelia, recommended by Andrew,<sup>4</sup> nitric acid, as recommended by Hopkins,<sup>5</sup> belladonna, in large doses, suggested by Wood,<sup>6</sup> or the hypodermatic use of atropine, as suggested as early as 1859 by Courty,<sup>7</sup> valerianate of atropia, as suggested by Michea,<sup>8</sup> veratrum viride, found efficacious by Winch,<sup>9</sup> platinic chloride, recommended by Dr. Huss,<sup>10</sup> sulphur baths, as recommended by Courtin,<sup>11</sup> local application of nitrate of silver to the larynx, as advocated by Bowditch,<sup>12</sup> quinine, as suggested by Dawson,<sup>13</sup> leonurus cardiaca, as recommended by Spottiswood,<sup>14</sup> compressed air, as recommended by Bertin,<sup>15</sup> and Guttman,<sup>16</sup> and glonoin, as suggested by Fraser,<sup>17</sup> I have little experience, but am disposed to think that they have been found efficacious in exceptional cases, and are scarcely to be recommended as available in a

<sup>1</sup> New York Journal of Medicine, 1845, vol. iv.

<sup>2</sup> Stethoscope and Virginia Med. Gaz., 1851, vol. i., : 572.

<sup>3</sup> Gaz. Médicale de Paris, 1878, 5th series, vol. vii., pp. 69 and 79.

<sup>4</sup> Glasgow Medical Journal, 1830, vol. iii., p. 190.

<sup>5</sup> American Journal of Med. Sciences, 1850, vol. xx., p. 549.

<sup>6</sup> Philadelphia Med. Times, 1874, vol. iv., p. 804.

<sup>7</sup> Gaz. des Hôpitaux, 1859, p. 531.

<sup>8</sup> Gaz. des Hôpitaux, 1856, vol. xxix., p. 579.

<sup>9</sup> Chicago Med. Journal, 1863, new series, vol. vi., p. 511.

<sup>10</sup> Jour. des Connais. Med. Chir., October, 1851.

<sup>11</sup> Gaz. Méd. de Paris, 1847, vol. ii., p. 961.

<sup>12</sup> Boston Medical and Surgical Journal, vol. lvii., p. 159.

<sup>13</sup> Western Med. Journal, 1848, third series, vol. i., p. 285.

<sup>14</sup> Med. and Surg. Reporter, 1879, vol. xl., p. 152.

<sup>15</sup> Montpellier Médicale, 1860, vol. iv., pp. 201, 419, 506.

<sup>16</sup> Wien. Med. Presse, 1878, vol. xix., p. 764.

<sup>17</sup> American Journal of Med. Sciences, October, 1887, and Feb., 1888.

very large class of patients. In late years, there have come into use two remedies, which possess noted value, these are *grindelia robusta* and *quebracho*. The first of these was first recommended by Gibbons,<sup>1</sup> who found excellent results from its administration, in a flattering number of cases, an observation which has been confirmed by a number of other observers. A larger experience, however, seems to show that whereas the *grindelia robusta* undoubtedly has a powerful effect in controlling the disease when first administered, it seems, at the end of a few months, to lose its efficacy almost entirely. The same I think can be said of the *quebracho*. We find, therefore, that our constitutional treatment of this disease will depend, as far as internal medication is concerned, largely upon the administration of iodide of potassium, after the manner above detailed.

Our systemic treatment, however, is not necessarily confined to the administration of drugs, for very much can be accomplished by certain general hygienic rules. The most important of these is the daily use of the cold bath, either in the form of a plunge or shower, or where this is not tolerated, the daily sponging of the skin. In addition to this, careful attention must be paid to those general rules of living, which have already been clearly indicated in the chapter on hay-fever, such as the regulation of the clothing, a certain amount of outdoor life and exercise, attention to diet, etc.

Asthma is not one of the diseases wherein we can give an absolutely favorable prognosis, in all cases. In other words, it is not one of the diseases that we can cure in every instance. Hence, our therapeutic resources failing, our final resort will consist in advising our patient to seek relief in change of climate. Unfortunately, asthma is, moreover, a somewhat fickle disease, and hence a climate which is favorable in one case, will prove unfavorable in another, and we may be at times somewhat at a loss, just what advice to give. In general, however, we may say that those cases of asthma which are associated with hay fever will find the greatest relief by residence at the sea-shore, while those which are purely neurotic, such as we have termed cases of bronchial asthma, will seek mountainous resorts, or high altitudes. Why high altitude should prove beneficial in these cases, it is difficult to say. Certainly it is not in the diminished atmospheric pressure, for this would tend to increase vascular plethora. Possibly the beneficial effect of high altitudes lies in the general tonic effect of the pure air, which we find in these regions. Whatever it may be, certainly clinical experience teaches us, that the best climate for the purely nervous asthmatic is the mountain regions. Thus, we find that asthmatics do well in the

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<sup>1</sup> Pacific Medical and Surgical Journal, 1867, vol. ix., p. 237.

White Mountains, the Adirondacks, Catskills, or in any elevated region, although complete relief is only obtained, probably, at an elevation of between 3,000 and 4,000 feet. This we find in Colorado, which affords a climate better adapted for the larger number of cases than any region found, probably, in this country. It should be said further, in regard to the effect of climate, that whereas relief is obtained immediately upon our patients resorting to these regions, and as long as they remain there, yet the disease is not cured, in that they become, as a rule, subject to their asthmatic attacks as soon as they return to the lower level. Hence, we must consider the climatic treatment of asthma as purely palliative, and warn our patients, that permanent relief is only to be obtained by permanent residence in the exempt regions.

## CHAPTER XVI.

### NASAL HYDRORRHŒA.

THIS is a term which we use to designate a curious form of disease which is occasionally met with affecting the nasal passages, in which the prominent symptom consists of a profuse watery discharge from the nose, and which, while presenting many of the symptoms of an ordinary attack of hay-fever, occurs at all seasons of the year. There is, however, a certain amount of periodicity about it, in that while occurring every day, it comes on in many instances only at certain definite times each day, while in other instances it seems to persist during the whole twenty-four hours.

The disease is an exceedingly rare one, and as we find but few instances recorded in medical literature, perhaps a better appreciation of the peculiar features of the affection will be obtained by a brief resumé of these cases.

The first observation on the subject is the report of a case by Rees,<sup>1</sup> although long previous to this Ammannus<sup>2</sup> had recorded an instance, the details of which are not sufficiently clear to warrant its being embraced in this category.

CASE I.—Rees's case was that of a woman, aged 52, who suffered from a constant dropping of a clear watery fluid from the left nostril. The dropping persisted during the whole of the twenty-four hours, and was especially distressing on lying down, when it caused attacks of suffocation. The general health was notably affected, and the patient suffered from general anasarca, which would indicate that the affection may have been dropsical in its nature although the full details and ultimate result are not stated. Treatment was unavailing.

CASE II.—Reported by Forster.<sup>3</sup> A young woman presented with a history of having suffered for six years with repeated attacks of profuse watery discharge from both nostrils, which persisted through the whole twenty-four hours, during considerable periods of time, although there were occasional intervals of three or four weeks' duration, when the discharge ceased entirely. Her general health was somewhat impaired, although not in a notable degree. The atmosphere of the city aggravated the affection, while the cool air of the country always gave a certain amount of relief. Hot weather also seemed to

<sup>1</sup> London Medical and Surgical Journ., 1834, vol. iv., p. 823.

<sup>2</sup> Misc. Acad. Anat. Curios., 1671 : Francof. et Lips., 1688, vol. ii., p. 282.

<sup>3</sup> New York Medical Times, 1852, vol. ii., pp. 113-115.



exercise an unfavorable influence. She was treated with nitrate of silver both internally and locally without avail.

CASE III.—Reported by Elliotson.<sup>1</sup> A female aged 26 was suddenly seized with a profuse watery discharge from the left nostril, which persisted for eighteen months, when it terminated somewhat abruptly, recurring again at the age of 40, coming on somewhat slowly now, and persisting for twenty-three months. The amount of water discharged was usually two quarts daily, although on one occasion it was three quarts. The fluid was of 1.010 specific gravity, and contained sodium chloride and sulphate, a small amount of mucus, and traces of calcium and phosphoric acid. The first attack seemed to have been brought on by an exposure to cold, which resulted in violent headache and which was only relieved by the sudden onset of the watery secretion. She was treated by means of blisters, leeching, blood-letting and various other measures without avail, the disease disappearing apparently of its own accord. The second attack came on without any apparent cause, and only attained its full activity at the end of two weeks. Again various remedies were tried without avail, until Brodie advised the internal and local use of sulphate of zinc, soon after which the dropping ceased. According to Brodie this was the result of treatment, although it is far more likely that the cessation was spontaneous, as in the first attack.

CASE IV.—Reported by Davies.<sup>2</sup> This was the case of a male, aged 50, who it is stated had syphilis fifteen years previously, although in what form, or with what manifestations is not stated. He was attacked with an abscess at the root of the second molar tooth of the left side, which discharged both into the mouth and through the antrum into the nose. The oral discharge ceased, but the nasal discharge had continued at the time of the report for two years and a half, and consisted of a somewhat profuse, thin, yellow, acrid fluid. It was worse in damp weather, and seemed to be aggravated by mental exertion. No addition to these somewhat meagre details is given, and the question still remains, as to whether this was really a case of nasal hydrorrhœa, or whether it may not have been a case of ordinary purulent catarrh of the antrum.

CASE V.—Reported by Tillaux.<sup>3</sup> This case was that of a male, who, following the removal of a nasal polypus, commenced to suffer from a profuse watery discharge from the nose, which persisted during the whole twenty-four hours, excepting that, when in the recumbent position, the discharge ceased, while if the head were bent forward, it seemed to be increased. The amount secreted in twenty-four hours was about nine ounces. An analysis of the fluid showed it to be identical with arachnoid fluid, and Tillaux was led to suppose that in the extraction of the polypus, the cribriform plate of the ethmoid was broken, and that the source of the discharge was the arachnoid cavity.

CASE VI.—Reported by Paget.<sup>4</sup> In November, 1876, a lady aged 48, while in the enjoyment of perfect health, received a blow over the left frontal sinus. It was a trivial accident and would have been forgotten but that in January, 1877, she had an attack of severe headache, lasting a few days, and in the following February she received a severe mental shock. In May of the same

<sup>1</sup> Medical Times and Gaz., London, 1857, vol. xv., p. 290; also, Brown's Archives, vol. iii., p. 665.

<sup>2</sup> Lancet, 1870, vol. ii., p. 592.

<sup>3</sup> "Traité d'anat. topograph." Second edition, Paris, 1878, p. 52.

<sup>4</sup> Medical Press and Circular, London, 1878, n. s. xxvi., p. 432; also Transactions Clinical Society of London, 1879, p. 43.

year, she began to suffer from a profuse watery discharge, confined entirely to the left nostril, which continued over a year and a half, with the exception of an intermission of a fortnight in May, 1878, when she had an attack of bronchitis, for which she took morphine, and during one night, when it also ceased spontaneously. With these exceptions, the fluid was constantly dropping during the twenty-four hours, the amount being from about eight to ten ounces a day. It was notably increased by mental distress, and also by exertion. At night, during sleep, it would collect in the nostril, pouring out only when the position of the head was changed. In specific gravity it varied from 1.004 to 1.010, and it was composed of 1.015 of solid matter to one hundred parts of the fluid; the solid matter consisting of albumin, chloride of sodium, traces of carbonate of soda and phosphoric acid. Paget prescribed for this patient one grain of sulphate of zinc three times a day, and to increase the dose gradually to twice that quantity, and also made a local application of a solution of the same salt, three grains in an ounce of water. This plan was followed for six weeks, when the symptoms subsided in a notable degree, and at the end of three weeks longer had completely disappeared. The patient remained perfectly well for a month, when, as the result of exposure to cold and great mental distress, she was attacked with a severe headache with vomiting, followed by restlessness, delirium, and other evidences of brain disease, and died comatose at the end of three days. Post-mortem examination revealed evidences of meningitis, involving a large part of the convexity of the brain. The base of the skull was healthy. In addition to this, there was found in the left antrum, a number of small rounded polypi, from one-half to two-thirds of an inch in diameter, projecting from its floor and outer wall.

The following case is one on which Althaus has built a most interesting study on the "Physiology and Pathology of the Fifth Pair of Cerebral Nerves" and is interesting in this connection, in that one of the symptoms consisted in a profuse discharge from the nose, evidently largely composed of serum tinged with mucus.

CASE VII.—Reported by Althaus.<sup>1</sup> P. G., aged 27, unmarried, a farmer, lived in Australia, had always enjoyed good health until in June, 1866, he was subjected to serious exposure in riding across the plains in the face of a high wind. While thus exposed, he was attacked with severe pain in the left side of the head, eyes, and face. At first the sensation was as if the face was frost-bitten, but subsequently it became of a dull throbbing character, and continued for five weeks. Some time afterward, as the result of a similar exposure, the right side of the face became involved in the same manner. The pain was not severe, and the attack did not last so long. After the disappearance of the pain, the following conditions set in: the corneæ of both eyes became covered with a thick opacity, resulting in complete loss of sight in the right, and impaired vision in the left. The skin and mucous membrane of the face became quite numb. After a period of some months in the hospital, without much change in his condition, he went to England and placed himself under Althaus's care, who found complete paralysis of sensation, involving all parts to which the trifacial nerve on each side was distributed. The sense of smell was normal. The vision was obstructed by thick glaucoma of both corneæ, although

<sup>1</sup> British Medical Journal, 1878, vol. ii., p. 831; also, Med. Chir'l Trans., vol. lli., p. 29.

the optic nerve was not affected, the eye symptoms being due entirely to the condition of the corneæ. Sensation of the face and scalp was entirely lost, the sense of temperature, touch, and locality being completely ablated. The conjunctiva was entirely anæsthetic, as well as the mucous membrane of the nose and the mouth. From the nose there poured forth such an abundance of acrid "mucus," that on running down upon the lips, it produced severe excoriations, together with complete destruction of the hair follicles of the moustache. Under treatment, which was confined entirely to the systematic application of the galvanic current, the improvement at the end of three months was most striking, and Althaus expressed the conviction that an entire recovery would ensue by the prosecution of this line of treatment.

CASE VIII.—Reported by Fischer.<sup>1</sup> Fischer noticed in one of his hospital cases, a male aged 42, under treatment for a fractured limb, that while in the hospital, he developed a severe attack of headache, followed by a profuse discharge from the left nostril, of a thin milky fluid, which was poured out to the amount of about half a pint. The discharge seemed to give relief to the headache. The fluid was of 1.003 specific gravity, and contained traces of albumin, sodium chloride, and phosphates. No echinococcus hooks were found. There was no neuralgia of the fifth pair of nerves. The patient had had two attacks before, no details of which are given, but he stated that the headache was relieved in each case upon the appearance of the discharge.

CASE IX.—Observed by the author. Dr. H—, aged 58, came under my observation in June, 1882, with the following history. Two months previously he caught what appeared to be an ordinary cold, characterized by nasal stenosis, sneezing and watery discharge, but these had continued ever since, apparently in a periodical manner as follows: He awakens every morning, quite free from every symptom, but usually about nine o'clock, there comes on a feeling of formication about the bridge of the nose, followed by intense sneezing and profuse discharge. It always comes on very suddenly, and persists for from three to six hours, although during the remainder of the day he is not entirely free from his symptoms. Occasionally, although rarely, the attack intermits a single day. The discharge seems to be of an absolutely pure watery character, and in the course of a daily seizure amounts to several ounces. Examination showed it to contain a small amount of chloride of sodium, with traces of phosphates and lime. This gentleman was seen occasionally, for a period of several years, during which time he was subjected to various plans of internal and local treatment, until the fall of 1884, when the discovery of cocaine placed in his hands a measure which gave more relief than anything which had previously been used, and to this day, he has continued the use of this drug, securing such relief as it affords, now a period of five years.

It is interesting to note in this connection, that when I first examined this patient, two months after the onset of his disease, I found no notable evidence of any chronic lesion of the nasal cavities, although subsequently he developed ordinary mucous polypi in the nasal chambers, which for the time seemed to aggravate his symptoms, and the removal of which gave a certain amount of relief, although limited.

The development of the polypi was undoubtedly due to the

<sup>1</sup> Deutsche Ztschr. für Chir., Leipzig, 1879, vol. xii., p. 369.



fact that the mucous membrane became sodden and infiltrated with serum in its escape from the turbinated tissues. In other words, it became so far water-soaked, as it were, as to lead to myxomatous degeneration. It might be stated in this connection also, that a certain amount of relief was given by the application of the galvano-cautery to the turbinated tissues; the action of this remedy being due to the fact, that the superficial cauterization deposited, as it were, upon the surface of the membrane a superficial and inelastic coat, which temporarily gave support to the blood-vessels, and for a time arrested the serous exosmosis. It might be further noted also, that a full trial of a continuous current in this case was made without relief, although a stronger current than that afforded by seven cells was not tolerated by the patient, on account of the severe pain.

CASE X.—Observed by the author. Dr. D—, aged forty, consulted me on April 7th, 1882, with the following history. For twelve months he had suffered from a profuse watery discharge from the nose, which had been a source of such distress to him as to almost incapacitate him for business. The discharge was not persistent through the day, but came on usually twice, viz., in the morning at 8, lasting about one hour, and again in the evening, from 5 to 6. The appearance of the discharge was preceded by a sense of intense formication about the bridge of the nose, followed soon by the dropping. The amount during the hour usually was about one ounce. On damp days, however, the discharge was persistent throughout the whole day, when its amount was usually a pint. With few exceptions, the discharge ceased during the night. Dry hot weather seemed to give relief. There was a history of intermittent fever twenty years before, and again eight years before. Up to twelve months before consulting me, he had been a sufferer from facial neuralgia. This, however, ceased with the setting in of the discharge. An examination showed his nasal cavities to be in a state of perfect health. The discharge was a clear white watery fluid, of a salty taste, and feebly alkaline, and contained a small amount of chloride of sodium, as shown by chemical test. I advised the use of quinine, which he took to the extent of ten grains each night, for three weeks, with the result of absolutely arresting the trouble. A week after, however, he ceased the use of the drug, and the discharge commenced again. He resumed his quinine, now without the slightest effect. During the following summer, he had an additional daily attack of an hour's duration, from 12 to 1 o'clock. At this time he tried the effect of various remedies. Atropia seemed to aggravate the difficulty. Townsend's remedy<sup>1</sup> was absolutely of no avail; tincture of elfrasia (a homœopathic remedy for hay fever) seemed to give notable relief for a time, in doses of eight minims every four hours. Ergot, in combination with digitalis, also was used without avail. In the fall he commenced to suffer at night for the first time, and as the cooler weather set in, he resumed the use of quinine with a certain amount of relief, although the continuance of his attack seemed now to have a notable effect on his nervous system, and he commenced to suffer from extreme mental depression. Occa-

<sup>1</sup> A proprietary remedy for hay fever which attained a considerable notoriety at one time, being erroneously reported to have cured Henry Ward Beecher of his hay fever.



sional doses of quinine now seemed to relieve him during the fall months, and on through the winter. The subsequent history of this case consisted in a certain amount of relief from the occasional use of quinine, and the trial of various other remedies without effect, until on February 1st, 1884, he commenced the use of the galvanic current from a battery of ten cells, with very marked relief, an electrode being applied on either nasal bone. This was continued until July 20th with the result apparently of curing him entirely. At this time he went to the mountains, and while in Saratoga he had an attack of a very severe character, lasting the whole day. He immediately returned home, and resorted to the use of electricity without avail, and in despair, concluded to abandon all treatment, when at the end of a few days, the discharge ceased as suddenly as it had come on, since which time he has enjoyed entire immunity from the affection.

It is interesting to note, in connection with this case also, that after the disease had persisted for something over a year, mucous polypi developed in the nasal cavities, which had heretofore been entirely healthy, and, as suggested in the previous case, due entirely, I think, to the profuse escape of watery fluid into the mucous membrane. The presence of these growths did not seem to notably increase the discharge, nor did their removal seem to ameliorate the symptoms. It should be stated in this connection, that this patient, in addition to the use of electricity, subjected himself to a systematic course of Turkish baths, followed by the cold sponge, together with vigorous massage three times each week, during a considerable period of time, in connection with the electrical treatment.

In addition to the above two cases which came under my own observation, I have in my note-book five others, the details of which, however, are somewhat meagre, and are scarcely worthy of record, other than as illustrating the fact that this disease is by no means so rare as one would suppose, when we consider the small number of cases that have been reported in current medical literature. Of these five additional cases, one was a maiden lady, aged forty, engaged in literary life, and of a decidedly neurotic temperament, whom I saw but once. The second, a young lady of twenty-eight, in the enjoyment otherwise of fairly good health, in whom no treatment was of any avail, although under occasional observation during a period of two years. The third was a physician of about forty, whom I saw but once, and who suffered from hay-fever during four months, while during the rest of the year he suffered from almost daily attacks of watery discharge from the nose, which was aggravated by intense cold, wind, dust, etc. The fourth was a gentleman aged fifty-one, who had suffered for a year with daily attacks, coming on early in the morning, from one to four o'clock, and lasting several hours, during which time there

was discharged about half a pint of clear watery fluid. This patient I saw but a single time. The fifth was a maiden lady, aged thirty-five, whom I have seen but twice, and who consulted me in regard to a watery discharge from the nose, attended with violent irritation and sneezing, and which came on daily, lasting two or three hours at a time.

CASE XI.—Reported by Speirs.<sup>1</sup> This case was that of a male, aged 58, who for nine months had been troubled with a discharge of watery fluid from the nostrils. The attack came on with sneezing, and was at first thought to be due to an irritating dust, arising from the coarse flannel upon which he had been working. Change of employment, however, had no influence on the discharge. The fluid was clear, watery, and did not stiffen the handkerchief, apparently containing no albumin, and did not excoriate the lip or nostril. The fluid was discharged drop by drop, as a rule, but sometimes it poured in almost a continuous stream from the nostrils. Exercise in the open air seemed to lessen the discharge. The sense of smell was unimpaired. At night he was obliged to sleep in almost an upright position, since when in a recumbent position, the fluid would overflow into the throat, exciting cough. Tannin and glycerin applications were without avail, but the discharge was permanently arrested by keeping the nostril filled with goose grease. Speirs was of the opinion that this application blocked up the passage from the nose into the antrum, which cavity he thought was the source of the discharge, and thus damming back the fluid, caused such changes to take place in the membrane lining this cavity, that it no longer secreted so profusely.

CASE XII.—Reported by Leber.<sup>2</sup> Leber reports the case of a young woman, 20½ years of age, who had suffered from hydrocephalus from birth, and who, in addition to headache and frequent epileptiform seizures, was annoyed by the dripping of a watery fluid, at first from the left nostril alone, but later the discharge would frequently cease from the left side, and affect the right. The quantity of fluid discharged varied from 4 to 22 cc. in the twenty-four hours. An ophthalmoscopic examination revealed atrophy of both optic discs. Although the discharge would occasionally intermit, as did the headache and epileptiform seizures (though no coincidence was noticed), it never ceased permanently.

CASE XIII.—Reported by Nettleship.<sup>3</sup> This writer reports a rather curious case of this affection, the clinical history of which differs decidedly from those already reported. The patient was a young lady aged 23, subject to hysteria and to palpitation, who was attacked rather suddenly with headache, prostration, and what was apparently a mild amnesic aphasia, forgetting words so that she was obliged to give up her position. During this illness, the eyes were said to have become prominent. There was some muscular weakness, particularly on the left side. There was no vomiting. During her illness the sight became very much impaired but subsequently improved. There was no emaciation. Eighteen months later Nettleship found post-papillitic atrophy of both optic discs, with contraction of the field of vision, especially at its outer part, the left eye being more affected. Two months before Nettleship made this examination, fluid began to drop from the nose. The symptom was less aggravated when she was in bed, but was not affected by abstinence from fluids for an entire day. The secretion of fluid was entirely confined to the left nostril, the mucous membrane of which

<sup>1</sup> *Lancet*, 1881, vol. i., p. 369.

<sup>2</sup> *Graefe's Arch.*, vol. xxix., 1, 273.

<sup>3</sup> *Ophth. Review*, London, 1883, vol. ii., pp. 1 to 3.

was swollen and excoriated. The fluid was neutral in reaction, and contained chlorides, traces of phosphates and sulphates, with a small quantity of albumin and mucin; hence it was probably nasal and not meningeal. One month later, the fluid became less in quantity from no apparent cause. At this time the patient developed a loud, ringing cough, and examination of the fauces revealed that the palate reflex was entirely lost. The case seems particularly interesting on account of the evidence of hysteria, together with exophthalmos and palpitation. The termination of the case is not given.

Cases XIV. and XV. reported by Priestley Smith<sup>1</sup> are somewhat similar to the last.

CASE XIV.—Was that of a male aged 28, who one month after an attack of small-pox, began to have severe headache and vomiting, soon after which the sight began to fail, and he became blind. The pain in the head remained unchanged, and four years later fluid began to drop from the left nostril. After continuing four months, the quantity of fluid diminished, and a week later stopped altogether. During this last week the pain in the head became decidedly worse, and the patient was very drowsy. On one occasion he slept for 36 continuous hours, and for nearly a week after was constantly falling asleep. At length he brightened up, and the discharge of fluid from the nose returned, this time from the right nostril. The discharge was diminished at intervals, and at these times the pain in the head would be much aggravated, and the patient would be more or less drowsy. These attacks gradually grew more and more severe, and in the later attacks there were some convulsive movements. He died two years after the exhibition of the nasal symptoms. There was no autopsy. Ophthalmoscopic examination during the illness had revealed an atrophy of both optic discs. Examination of the fluid showed its specific gravity to be 1.007. It contained alkalies, albumin and mucin, and did not reduce copper. Its source, then, was probably the nose and not the arachnoid space.

CASE XV.—Was a male aged 22, who five years before, after prolonged mental exertion, which had made him very subject to headache, suddenly had a cerebral attack from which he fell forward, lost consciousness, and developed internal strabismus. For many months consciousness was imperfect, and he was subject to fits of delirium, severe pain in the head and vomiting. He became blind, and ophthalmoscopic examination revealed double optic neuritis, which subsequently passed into atrophy. For fourteen or fifteen months the lower extremities were completely paralyzed. Two and a half years after the beginning of the attack, fluid began to drop from the right nostril. Some months later, this became stopped with a polypus, subsequent to which time, fluid came from the left nostril. The polypus was removed from the right side, but soon recurred. The amount of fluid varied from twelve to fifteen ounces in twenty-four hours. When the discharge of fluid became less, he felt pain in the back, between the shoulders, which would gradually creep up toward the base of the skull, leaving the frontal region free from pain. Exercise increased the flow. His mother noticed that when the nasal secretion became diminished, urinary secretion became more free. The fluid was essentially the same as in the first case. The author was inclined to explain this occurrence by an obscure nasal growth, destroying the cribriform plate, or pressing upon it.

CASE XVI.—Reported by E. B. Baxter.<sup>2</sup> A female, aged 35, had been in

<sup>1</sup> Ophth. Review, London, 1883, vol. ii., p. 4.

<sup>2</sup> Brain, vol. iv., p. 525.



perfect health up to the time of her marriage. Five months afterward, she had been subjected to considerable worry and anxiety, and began to suffer from certain nervous symptoms, which steadily increased, until she was first seen two months after. She at first suffered from headaches, but shortly afterward a clear watery fluid, sometimes rather offensive, and occasionally tinged with blood, began to come away from the right nostril. The headache, which was very severe, usually began at the right of the nose, and also involved the temporal region. Ophthalmoscopic examination showed double optic neuritis. The teeth in the upper jaw were decayed. There was uniform soft hypertrophy of the thyroid body of ten years' duration. Three years after the symptoms began, the patient died. A rather imperfect autopsy revealed no nasal lesion, and no lesion of the brain.

CASE XVII.—Reported by Mathiesen.<sup>1</sup> The patient was a thirteen-year-old boy, who had a severe fall, following which he was unconscious for some time. The following night he suffered from vomiting and epistaxis. About two months after the accident, he came under observation on account of the discharge of a thin watery secretion of a salty taste from the left nasal cavity. In the course of two hours twenty-five centimetres of this fluid were collected. His general health was good. Five days later the discharge ceased. Microscopical examination of the fluid revealed white blood-corpuscles, a few threads of mucus, and pavement epithelium. The fluid was of a specific gravity of 1.006, and of alkaline reaction, and otherwise corresponded to a cerebro-spinal fluid. The writer was in doubt whether the source of the discharge was the cerebral or the nasal cavity.

CASE XVIII.—Reported by Vieusse.<sup>2</sup> Vieusse reports the case of a young man, who consulted him eight days after a severe fall upon the head, which had caused unconsciousness, and a discharge of blood from the left ear and nose. When seen by Vieusse, he complained of severe headache, and there was a serous discharge from the nostril. On examination later, it was found that the serous fluid came either from the nostril or left ear according to the position of the head. About two drops were discharged each second. Death occurred, from meningitis, eighteen days after the accident. An autopsy revealed a fracture of the base, involving the cribriform plate of the ethmoid.

In addition to these we find cases reported by C. J.<sup>3</sup> and Lingard<sup>4</sup> as examples of this disease, the former of which seems to have been an ordinary case of idiosyncratic coryza, while the latter was a case in which the symptoms were due to the excessive use of the cold-water douche. Lingard's idea seems to have been, that the watery discharge was due to the fact that the accessory sinuses became filled during the use of the douche, and hence the dripping which followed it, was really the water escaping from these cavities. Whatever may have been the cause, the symptoms disappeared on abandoning the use of the douche. If Lingard's view was a correct one, which I very much doubt, the case is certainly quite unique.

<sup>1</sup> Norsk. Magazin for Laegevidenskaben, p. 41, Jan., 1887.

<sup>2</sup> Gaz. Hebdomadaire, 1879, No. 19, p. 298. <sup>3</sup> British Medical Journal, 1879, vol. i., p. 175.

<sup>4</sup> British Medical Journal, 1878, vol. ii., p. 921.

ETIOLOGY.—We have here a collection of exceedingly curious cases, and at first sight it would seem to be by no means a simple matter to give an explanation of the phenomena which they manifest, other than pure speculation, and yet I think there is much that is exceedingly instructive. The first feature which strikes us perhaps is the fact, that in a certain class of cases, the escape of watery fluid is purely passive and painless, while in the other, the flow of water gives rise to symptoms of intense irritation, such as we observe in ordinary cases of hay fever. This one symptom will serve to divide these cases, then, into two classes. In the first of these, the essential lesion consists of an ablation of function of the trifacial nerve, which, as we know, exercises an inhibitory action upon the serous exosmosis which takes place normally in the nasal mucous membrane. In connection with the paralysis of this nerve, of course, there occurs paralysis of sensation, and hence the transudation of fluid takes place without consciousness on the part of the sufferer. This feature was particularly noticeable in Althaus's case, in which the pathological lesion seems to have been thoroughly recognized, and the diagnosis established, of neuritis involving the fifth nerve of both sides. The question arises whether the disease is due to a neuritis, as in this case, or to some other lesion, affecting either the nerve trunk, or the central ganglia, as there is good ground to think existed in Priestley Smith's two cases, as well as in Nettleship's, although neither of these authors adopted this view. In Paget's case, an autopsy revealing the existence of polypi in the antrum of the side affected, these were accepted, without question, as the cause of the watery discharge. A more rational view, it seems to me, is that the polypi were the result of the affection, and that the essential lesion consisted of some obscure condition at the base of the brain, which gave rise subsequently to an attack of acute meningitis, to which the patient succumbed. Certainly it is difficult to understand how the existence of polypi in an antrum should cause the symptoms, while, on the other hand, it is very easy to see how a vaso-motor paresis with profuse watery discharge should give rise to myxomatous degeneration, whether in the antrum or in the nasal cavity, in the same manner as occurred in two of my own cases which are reported in full.<sup>1</sup> In another class of the cases, we see that the watery discharge gives rise to an intense irritation of the nasal mucous membrane, as manifested by the peculiar formication and sneezing which becomes a source of exceeding great distress. This, of course, can only occur in cases where the general and special sensibility of the Schneiderian membrane is intact, or in other words, in cases in which the

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<sup>1</sup> Cases IX., X.

integrity of the trifacial nerve is preserved. We must, therefore, seek for a cause of the hydrorrhœa in these cases, in some cause other than a lesion of the trifacial. We content ourselves with the statement, that the lesion here consists of some disturbance or irritation, involving the sympathetic system of nerves. Whether this is peripheral or central, can only be a matter of speculation. It is a noticeable fact, in these cases, that there is no evidence of cerebral disturbance whatever, other than an occasional headache, which is relieved by the setting in of the watery discharge. The headache is easily explained, in that it is probably an ordinary plethoric headache, which is relieved by the local exosmosis, in much the same manner as we frequently see headaches relieved by the relief of nasal hyperæmia. This latter class of cases, therefore, is very closely analogous to ordinary cases of hay fever. Moreover, we see in them a certain diurnal periodicity, which would seem to indicate that the causes which act to produce the symptoms, are operative only under certain atmospheric conditions. In a number of these cases, the membrane seemed to be exceedingly sensitive to the action of cold, wind, dust, or other causes, thus manifesting a condition which is almost always present in hay fever, in that a large majority of patients who suffer from autumnal attacks of this disease, are peculiarly sensitive, at all seasons of the year, to the action of smoke, dust, or irritating vapors. Sex would seem to have but little influence on the affection, in that of the twenty-three cases given above, thirteen were males and ten females. It belongs essentially to adult life, as the ages of these patients were from twenty-two to fifty-two, with the exception of Mathiesen's case, which was a boy of thirteen, who in all probability suffered from fracture of the base of the skull. Traumatism, as a possible remote cause, is mentioned in several of the histories, although a careful reading of the cases fails to establish any clinical connection between the injury and the hydrorrhœa. In Tillaux's case, I think the suggestion of fracture of the ethmoid is quite superfluous, in that the existence of the polypi seems to have been quite sufficient to establish some antedating and efficient cause for the watery discharge. Davies's case was undoubtedly one of suppurative disease of the antrum. The neurotic element seems to have been present in many of these cases, in much the same way as we find it in hay fever, which brings us to the question, as to what relation the one disease bears to the other. Certainly, as regards the cases dependent on lesion of the trifacial, I doubt if there is any connection, but in those in which the trifacial was not involved, and which we refer to some obscure lesion of the sympathetic, I think there can be no doubt that the disease is very closely



allied to hay fever, in that it is dependent, to a large extent, on what we call the neurotic habit. The other two essential causes of hay fever, viz., a diseased condition of the nasal mucous membrane, together with the impact upon it of the pollen of flowering plants, are not present. In my own cases, no lesion was found in the nasal cavities. We can only say, then, of these cases, that in connection with an intensely neurotic temperament, the nasal mucous membrane is rendered sensitive to some obscure atmospheric condition, under the action of which vaso-motor control of the blood-vessels, whose special function is the exosmosis of serum in the normal process of respiration, becomes paralyzed, and that this exosmosis takes place to an abnormally large extent. Under the term neurosis, of course, in our ignorance of essential pathological lesions, we must include some probable organic lesion of the nerve-trunk, or ganglionic centres of the sympathetic system. That there is an atmospheric condition which excites the attacks in some instances, I think we must accept on clinical grounds, in that they occur daily, at about the same time, and in each individual case persist for the same period. This view is, furthermore, strengthened by the fact that dampness, heat, and other atmospheric conditions, have a marked influence in aggravating or alleviating the severity of the symptoms.

SYMPTOMATOLOGY.—The symptoms of the affection are clearly indicated in the histories above given, and consist essentially in a dropping of clear, transparent watery fluid from the nose, which may either come on gradually, or abruptly, and while it lasts, consists of a constant flow of water from the nostril, which may be attended with a violent sense of irritation or not, according as the disease is dependent upon a morbid condition in the sympathetic control of the blood-vessels of the nasal mucous membrane, or of the trifacial. This dripping may continue during the whole twenty-four hours, or it may manifest a certain diurnal periodicity. Where it occurs during the night, it is usually somewhat diminished, although in many cases it continues during the sleeping hours, accumulating in the cavity of the nose, and pouring out, as it were, on a change of position. If it passes into the pharynx, it may give rise to cough, or even attacks of spasm of the glottis, as occurred in Rees's case. In Althaus's case, the discharge poured out upon the upper lip, producing excoriation, and ultimately almost a cicatricial condition of the skin. If the attack is accompanied by sneezing, etc., it may become a source of very great distress and even suffering to the patient. Where, however, sensation is abolished in the nasal cavity, the condition is merely one of discomfort and annoyance, as far as the watery discharge itself is concerned.

PROGNOSIS.—In those cases which are essentially a neurosis of the sympathetic, and which are so closely allied to hay fever, the prognosis is somewhat unfavorable, in that we have difficulties to contend with here, even greater than those with which we have to contend in hay fever. Now, this latter disease, as we know, is an exceedingly fickle one, and in many cases will resist every effort to afford relief, although we have here a definite local lesion in the nose, as a prominent factor in causation, and the removal of which presents a clear indication for treatment. In the disease in question, however, the only tangible lesion with which we have to deal, is the neurosis, and this in most cases will seriously tax our therapeutic resources. Of seven cases of this variety which were under my own care, but one was cured, although but three of them were under my care for any prolonged period of observation. Moreover, in the one case which was cured, it is somewhat doubtful whether the fortunate termination was the direct result of any therapeutic measures. As regards the cases dependent upon a lesion of the trifacial, no prognosis can be given, unless the special lesion which has caused the disease can be definitely ascertained, in which case the prognosis will be based entirely on this information.

TREATMENT.—The indications for treatment are twofold, viz., the use of such local applications in the nose as control vascular turgescence, and second, the resort to such therapeutic resources as we possess, for the remedying of the morbid lesion in the nerve trunk. The first indication is better carried out by the resort to cocaine, whose local action in controlling vascular turgescence is prompt and certain, beyond any other drug which we possess. The patient should be provided with a proper atomizer, and commencing with a four-per-cent solution, gradually reduce it, until he finds the weakest solution which will afford him relief, when he is allowed to obtain such comfort as may be afforded by its application, as frequently as may be demanded. I think it is very questionable, on reading the reports given above, whether internal remedies have proven of much avail. Elliotson's case seems to have been cured by the internal and local use of zinc, yet I think it an open question, whether either the local or internal use of this drug had the slightest influence on the attack. Paget's case was very similar. In Althaus's case, the diagnosis was made, and clear indications carried out, with a good result. In the second of my own cases, after the use of numberless drugs, the patient was finally cured by the use of the galvanic current, locally applied, a method of treatment which seems in every way rational, and apparently clearly indicated, and yet in my first case, this resort was not only of no avail in giving relief, but seemed to aggravate the disease.

The best then that we can say in regard to treatment, is that where we can definitely ascertain the cause of the disease, the indications for treatment are clear. Where the cause of the disease is obscure, as is the case in the large majority of instances, any plan of treatment must be to a large extent experimental, and governed by such indications as may be found to exist upon a careful study of each individual case.



## CHAPTER XVII.

### ANOSMIA.

DISTURBANCES of the function of olfaction may manifest themselves in an increased activity of this sense, giving rise to what is usually designated as hyperæsthesia of the olfactory nerve, by the action of which odors are appreciated with a very high degree of sensitiveness. This condition, is almost invariably met with in connection with hysteria, and presents no point of special clinical interest. Cloquet,<sup>1</sup> however, has observed it in connection with disease of the intestines, testicles and uterine organs. Again, we not infrequently meet with a curious perversion of this function, termed parosmia, or paræsthesia of the olfactory nerve, under the action of which, imaginary impressions are received, usually of a disagreeable kind, which are purely subjective, and are the result of some pathological lesion in the olfactory bulb, nerve, or of some central brain lesion. Or, again, it may be purely subjective, as in a case observed by Berard,<sup>2</sup> in which the patient complained of unpleasant and offensive odors. An autopsy was performed subsequently and the olfactory nerves were found completely destroyed.

From a clinical point of view, this condition perhaps occurs most frequently as a subjective hallucination in cases of insanity, although it may occur in connection with any form of organic brain disease. Our main interest, however, in this connection, lies in the consideration of that form of perversion of this function, which is characterized by an impairment or total loss of the sense of smell, usually designated as anosmia.

ETIOLOGY.—This symptom may arise from any condition which either interferes with the entrance to, and impact of odorous particles upon the mucous membrane lining the upper portion of the nasal cavity, called the olfactory tract, or from any morbid condition of the nerve itself, which prevents its full appreciation of the odorous character of those particles. Under this latter head may be embraced lesions of the terminal filaments of the nerve, lesions of the trunk of the nerve, or lesions of the bulb. Under the former class may be embraced acute rhinitis, hypertrophic

<sup>1</sup> *Osphræologie*, Paris, 1821, p. 749.

<sup>2</sup> *Froriep's Notizen*, vol. xi., p. 151.

rhinitis, fractures or deformities of the septum, nasal polypi and other forms of neoplasm. In much the same way, tumors of the pharynx or palato-pharyngeal adhesions, give rise to anosmia, in that the inspiratory current of air through the nose is interfered with. In these cases, the symptom is due to purely mechanical causes, and yet, while a nicer use of the term anosmia would suggest that it would be confined entirely to cases of purely neurotic origin, yet it is customary to group them all under the same consideration. Among the causes of the disease, which lie in a morbid condition of the nerve itself, are embraced, atrophy of the bulb or of the trunk of the nerve, as in cases observed by Prévost<sup>1</sup> and Notta,<sup>2</sup> or the nerve may be absent, as in cases reported by Dubreuil,<sup>3</sup> Pressat,<sup>4</sup> Blandin,<sup>5</sup> Després,<sup>6</sup> de San Juan<sup>7</sup> and Bernard.<sup>8</sup>

In addition to these, several congenital cases have been reported by Notta.<sup>9</sup> Traumatism also plays an important part in the production of the symptom, giving rise to fracture of the base of the skull, as observed by Notta<sup>9</sup> and Mollière,<sup>10</sup> or in a separation of the bulb from its branches, as they enter the cribriform plate of the ethmoid, as Ogle<sup>11</sup> suggests, and as probably occurred in Legg's<sup>12</sup> case, where the injury resulted in permanent loss of the sense of smell, although in a very similar case reported by Rotch,<sup>13</sup> which was attended with hemorrhage from the ears, nose, and mouth, the anosmia disappeared at the end of six weeks.

In a case observed by Hamilton,<sup>14</sup> permanent anosmia supervened upon a meningitis following a blow upon the occiput.

Tumors of the brain, it would seem, are not liable to give rise to complete anosmia, in that their location as pressing upon both nerves, would be somewhat unusual. Thus, Loder<sup>15</sup> met with a case from scirrhus of the pituitary body. Oppert<sup>16</sup> also found an abscess of this body, pressing on both olfactory nerves, resulting in loss of the sense of smell, Huguenin,<sup>17</sup> however, in reporting two

<sup>1</sup> *Gaz. Médicale*, 1866, No. 37, p. 597.

<sup>2</sup> *Arch. Générale*, 1870, vol. i., p. 385.

<sup>3</sup> *Gaz. Médicale*, 1835, 2 s., vol. iii., p. 243.

<sup>4</sup> Cited by Longet, *Anat. et Phys. du Système Nerveux*, vol. ii., p. 39.

<sup>5</sup> *Bul. de la Soc. Anat.*, Paris, 1827, Second Edition, 1844, vol. ii., p. 18.

<sup>6</sup> *Bul. de la Soc. Anat.*, Paris, 1841, p. 140.

<sup>7</sup> *Siglo Med.*, Madrid, 1857, vol. iii., pp. 211 and 218.

<sup>8</sup> Cited by Althaus, *Lancet*, 1881, p. 771.

<sup>9</sup> *Loc. cit.*

<sup>10</sup> *Lyon Médicale*, 1871, vol. viii., p. 385.

<sup>11</sup> *Med-Chir. Trans.*, 1870, vol. liii., p. 263.

<sup>12</sup> *Lancet*, Nov. 8th, 1873, vol. ii., p. 659.

<sup>13</sup> *Boston Medical and Surg. Journ.*, 1878, vol. xcix., p. 130.

<sup>14</sup> *Trans. of the Col. of Physicians*, Philadelphia, 1870, n. s., vol. iv., 362.

<sup>15</sup> *Observatio Tumoris Scirrhusi in basi Cranii reperti*, Jen., 1790.

<sup>16</sup> *Dissertatio inaug. de Vitiis Nervorum Organicis*, Berol., 1815.

<sup>17</sup> *Correspondenzblatt für Schweizer Aertze*, 1882, vol. xii., pp. 257 and 295.

such cases, has found that this symptom is due rather to a basilar meningitis, excited by the presence of the neoplasm. There can be little doubt that very many cases of cerebral hemorrhage or neoplasm result in a destruction of functional activity in the olfactory nerve on one side, and yet this condition is probably so far masked by the more serious symptoms which result from the central lesion as to escape notice. The main point of interest in this connection, is that this condition always occurs on the left side, and is associated with aphasia and paralysis of the right side of the body as observed by Hughlings Jackson,<sup>1</sup> Ogle and Fletcher.<sup>3</sup>

In an interesting case observed by Althaus,<sup>4</sup> this symptom developed in the second stage of an attack of locomotor ataxia, about six years after the onset of the disease, while in one of Mollière's<sup>4</sup> cases, it was due to cerebral syphilis, as also in Romberg's<sup>5</sup> case.

Those cases, in which the affection is the result of a morbid condition of the terminal filaments of the olfactory nerve, are probably also to be classed as neurotic. In this category are to be embraced those cases in which permanent anosmia results from the inhalation of irritating or highly offensive gases, or powerful odors. Thus, Graves<sup>6</sup> reports a case, in which a man subjected himself to the exceedingly offensive and irritating gases which emanated from a cesspool, for a period of several hours' duration, with the result of permanent loss of the sense of smell, and again in a case reported by Stricker,<sup>7</sup> the same accident happened to an entomologist from working several hours a day in an atmosphere surcharged with ether, which he used in the preparation of his specimens. It is a noticeable fact, in these cases, that the anosmia only occurred after the terminal filaments of the nerve had been subjected to the irritating action of these agents, for a somewhat prolonged period of time, for while, as we know, if we subject the olfactory tract to the irritating effects of strong ammonia, for instance, the sense of smell is abolished temporarily, although no permanently deleterious effects occur. Its prolonged action, however, must undoubtedly give rise to some definite morbid change. It may be that the physiological irritability of the nerve is destroyed simply by prolonged and excessive irritation, or possibly a localized inflammatory process arises about the terminal filaments. A more plausible suggestion, however, is that of Althaus,<sup>4</sup> that a capillary hemorrhage occurs in the nerve itself.

<sup>1</sup> London Hospital Reports, vol. i., p. 410.

<sup>2</sup> Loc. cit., p. 273.

<sup>3</sup> Brit. Med. Journ., April, 1861.

<sup>4</sup> Loc. cit.

<sup>5</sup> "Klinische Ergebnisse," p. 18.

<sup>6</sup> Cited by Notta, loc. cit.

<sup>7</sup> Virchow's Arch., vol. xli., p. 291.



Atrophic rhinitis, or ozæna, in its late stages, is attended with more or less complete loss of the sense of smell. This may be due to the fact, that the crusts and scales of dry mucus which lodge upon the surfaces of the turbinated bodies, prevent the approach of olfactory particles, or it may result from the fact, that the terminal filaments of the nerves are destroyed in the process of atrophy, which, as we know, results in a condition verging on sclerosis of the mucous membrane, the atrophy of the nerve filaments being due entirely to pressure. It is probable, however, that the anosmia is due to a combination of both these factors.

A somewhat curious suggestion is made by Mackenzie,<sup>1</sup> that anosmia occurs in connection with paralysis of the seventh nerve, and that the orbicularis muscle being paralyzed, the tears flow over the cheek, instead of through the nose, thereby leading to an abnormal dryness of the nasal mucous membrane. It is scarcely necessary to suggest, that tears flowing through the lachrymal canal, in no way approach the olfactory tract, and furthermore, the nasal mucous membrane receives its moisture from the turbinated bodies, rather than from the tear-duct. Allusion has already been made<sup>2</sup> to the importance which Ogle attributes to the presence of pigment in the olfactory region, in the physiology of olfaction, the corollary of which is, that its absence may be an important factor in the impairment of this function. Ogle substantiates his view by the report of a case in which a colored boy underwent a process of bleaching, as it were, until all parts of his body, which were not exposed, became white, while at the same time, the sense of smell gradually became impaired, and finally almost completely disappeared. He instances also a number of analogies, both in man and among the lower animals, showing that the sense of smell is more highly developed in the colored races, and furthermore in animals with a pigmented skin. The argument is ingenious, and admirably sustained, and yet it is certainly impaired by the fact, that albinos, both in man and the lower animals, are not universally anosmic, yet even these, as Ogle shows, afford ground for his argument, in the fact, that among the lower animals, the acuteness of the sense of smell seems to bear a certain proportion to their general pigmentation.

SYMPTOMATOLOGY.—The close relation between the sense of smell and the sense of taste has already been fully discussed in connection with the physiology of olfaction, where it was shown, that the sense of taste consisted only in the ability to appreciate

<sup>1</sup> "Diseases of the Throat and Nose," American Edition, Philadelphia, 1884, vol. ii., p. 455.

<sup>2</sup> Chapter VI., on the Physiology of the Nose.

the *bitter, sweet, salt* and *acid* qualities of substances brought in contact with the mucous membrane of the tongue and palate, and that the more delicate elements of the sense of taste were due entirely to the appreciation of their odor, by the olfactory nerve. A loss of the sense of smell, therefore, is always accompanied by a deterioration of the sense of taste, and it is through this latter deficiency, that anosmia really is recognized, in the majority, if not in all instances. There seems to be a connection between the olfactory properties of the upper nasal passages, and general sensation, although Magendie<sup>1</sup> entertained the view, that olfaction was dependent upon the branches of the fifth pair, a view which Bernard<sup>2</sup> supports, by reporting a case, in which the disagreeable odors of an outhouse were complained of by a patient, in whom the cribriform plate, together with the olfactory nerves, were found absent on post-mortem examination. This may have been a case of parosmia, similar to that of Berard's,<sup>3</sup> or more probably, as Althaus suggests, the disagreeable odors were largely made up of ammoniacal effluvia of the fetid hydrogens, which could easily be appreciated by the general sensation of the mucous membrane. From a clinical point of view, however, the two properties are distinct, and in no way interdependent, in that the anosmia may be complete while the general sensation is in no degree impaired. In the majority of instances, however, the condition is not one of complete anosmia, but rather a more or less notable impairment of the function. Especially is this true of those cases in which the condition is due to an obstructive lesion in the nose, which prevents the entrance of odorous particles, as in nasal polypi and other tumors, acute rhinitis, hay-fever, etc., the extent of the anosmia bearing a close relation to the patency of the cavity. Where, however, the affection is due to a nerve lesion, the anosmia is usually complete, although it is noticeable in this form of the disease, that, in many cases, the complete loss of function is preceded by certain disturbances, such as hyperosmia or parosmia. Thus, in a case reported by Lockeman,<sup>3</sup> the primary stage of the affection was marked by the appreciation of disgusting odors, while Althaus<sup>4</sup> has observed a case, in which the odor of phosphorus was a source of great annoyance to a patient, who subsequently developed complete anosmia.

PROGNOSIS.—The differential diagnosis between essential and symptomatic anosmia is a matter of some importance, as regards prognosis, in that while recovery from the former is exceedingly rare, in the latter, we may usually give a favorable opinion, de-

<sup>1</sup> Jour. de Phys. expér., Paris, 1824, vol. iv., p. 169.

<sup>2</sup> Loc. cit.

<sup>3</sup> Cited by Althaus, loc. cit.

pendent upon our ability to remove such local obstructive lesion in the nose as rhinoscopic inspection reveals. Perhaps the only cases in which a favorable opinion can be given in essential anosmia, are those dependent on syphilis. In a case reported by Raynaud<sup>1</sup> the anosmia seemed to be due to malarial poisoning, in that it was intermittent, recurring every day at five o'clock; moreover it was entirely cured by the administration of quinine. A nice question arises here, as to how long the olfactory nerve will retain its integrity, while its function is affected by an obstructive lesion of the nasal cavity. It is an almost universal rule in the economy, applying alike to gland structures, muscles, and probably to nerves, that when their function is ablated, they show a tendency at least to degenerative changes of an atrophic character. Hence, if the function of the olfactory nerve is suspended by some lesion of the nose, which absolutely prevents the approach of odorous particles, this tendency manifests itself, and if the lesion remains for a sufficient period of time, the nerve will have undergone such atrophy as that its integrity cannot be restored by the removal of the obstruction. Perhaps no definite period can be stated, during which this nerve may retain its functional activity, and probably it varies in different individuals. I have never seen a case, for instance, of nasal polypi, in which both cavities were completely filled with polypi without relief for ten years, in which complete and permanent anosmia did not supervene. I have seen, in many instances, cases in which the sense of smell was abolished for four to six years, from this cause, and yet ultimate recovery ensued. Notta<sup>2</sup> has seen a case of anosmia due to polypi, in which recovery took place at the end of fifteen years. We can only state then, that perhaps six or eight years of total ablation of function will result in a permanent loss of the sense of smell, probably as the result of degenerative changes, either in the olfactory trunk, or at the nerve centres. It is not to be understood that the prognosis is unfavorable in all cases of anosmia due to brain lesions. Thus, in a case reported by Ogle<sup>3</sup> dependent on apoplexy, there was ultimate recovery. A like conclusion also resulted in Rotche's cases, in which there was probably a local extravasation at the base of the brain; and in three of Notta's cases, where there was fracture of the base of the skull. These cases, however, are somewhat exceptional. Dubreuil<sup>4</sup> reported a case, in which the anosmia occurred in connection with a cleft palate, and where post-mortem examination showed absence of the olfactory nerves, which would suggest an explanation of the symptoms occasionally met with in

<sup>1</sup> Union Médicale, July 10th, 1879, p. 58.

<sup>3</sup> Loc. cit., p. 273.

<sup>2</sup> Loc. cit., p. 405.

<sup>4</sup> Loc. cit.



connection with the deformity, in that a cleft palate is very frequently associated with a malformation or deficiency of the brain.

**PATHOLOGY.**—It is impossible to describe any pathological lesion as belonging essentially to anosmia, in that the disease is a symptom of a variety of diseases, rather than a disease itself. Thus, it may be dependent upon a tumor of the brain, pressing upon, or involving the olfactory centre in or near Broca's convolution; or involving, or perhaps pressing upon, the nerves in their continuity; or upon the bulbs themselves. It may be due to congenital absence of the bulbs and nerves. In Oppert's<sup>1</sup> case, there was an abscess of the pituitary gland, and in Bonet's<sup>2</sup> cases there was pus formation in the olfactory bulbs themselves. Again, the nerve may become involved in local inflammatory changes in connection with meningitis. The only special interest which attaches to this branch of the subject, however, is in connection with the changes which may occur in the olfactory region. I know of no observations bearing on this subject, and yet it seems clear, that, in many cases, we must concede that the diseased condition of the brain itself is responsible for the loss of the sense of smell. Aside from those conditions in which the approach of odorous particles to the terminal filaments of the olfactory nerve is prevented, this condition probably consists of some atrophic change, occurring in the terminal filaments of the nerve, due, either to the pressure of local inflammatory deposits, or to a deficiency of circulation, this latter condition being the one which exists in the ordinary forms of atrophic rhinitis; or, again, it may possibly be connected with the degenerative changes which occur in old age. Thus, Prévost<sup>1</sup> in an examination of a large number of cases, has found certain degenerative changes in the olfactory nerve trunk, as belonging especially to advanced life, in which the trunk of the nerve is less bulky, and fills a relatively smaller space in the groove of the ethmoid, while the nerve fibres themselves are diminished in number, their place being supplied, as it were, by increased numbers of amyloid corpuscles. In more frequent instances, however, we must look for local inflammatory changes, as the source of the condition. Thus, in an ordinary acute rhinitis, we may have anosmia persisting for many days after the inflammatory process undergoes resolution; while in hay-fever, in which the local inflammatory action persists for a still longer period of time, there may result an anosmia, of even months' duration. The same thing also occurs in croupous and diphtheritic rhinitis, especially in the latter, where the symptom is the result of local changes, rather than of blood poisoning.

**DIAGNOSIS.**—The essential importance of the diagnosis consists

<sup>1</sup> Loc. cit.

<sup>2</sup> Sepulchretum, Genève, 1700, lib. i., sec. xx., obs. i., p. 441.

in the determination, as to whether the symptom be due to a local condition of the nasal chambers, or a diseased condition of the nerve. In other words, whether we have to deal with an essential or symptomatic anosmia. This can only be determined by a careful examination of the nasal cavity, and by the elimination of any possible local cause there. This, taken in connection with the history of the case, and the concomitant symptoms, ordinarily will suffice to establish, with a considerable degree of certainty, the existence or non-existence of any central disease. We eliminate, then, from consideration, brain tumors, hemorrhages, abscesses, meningitis, tabes and all diseases of this character, in that, in such cases, an anosmia becomes a symptom of the most trivial character, in the presence of an exceedingly grave organic affection, and only interest, as serving as a possible, though unimportant aid to diagnosis, in that, as Hugueinin<sup>1</sup> observes, anosmia may occur in connection with brain lesions, even remote from the olfactory centres.

The simple test for olfaction consists in the use of odorous substances. In the selection of these, however, one should always make use of a substance which is recognized purely by its odorous qualities, the most delicate test, of course, being the fragrant odors, whereas the disagreeable odors are often deceptive, in that what is unpleasant, often is not necessarily a genuine odor. If it is desired to accurately and determinately ascertain the condition of the olfactory nerve it will be necessary to resort to the use of the galvanic current, Althaus having shown that this nerve affords a direct response to the electrical stimulus, when healthy. A current from a thirty-five-cell battery being passed as nearly as possible through the course of the nerve, gives rise, according to the integrity of the nerve, to a well-marked subjective odor of phosphorus. Unfortunately, the application of this test may be exceedingly limited, in that, except in rare instances, where there is paralysis of the fifth pair of nerves, a current of this strength will be too painful for endurance. The existence of a unilateral essential anosmia, although not easily recognized, can be determined by delicate tests, and ordinarily should be regarded as evidence of brain lesion. A determination of the loss of smell, on one side alone, would require, of course, a very careful and complete closure of the opposite cavity, both before and behind.

TREATMENT.—Clinical observation has failed, as yet, to afford us any very notable suggestions for the successful treatment of an essential anosmia. Our interest in this connection mainly centres on those cases in which this function is to a greater or less degree enfeebled, as the result of some obstructive lesion in the nasal cav-

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<sup>1</sup> Loc. cit.

ity. In the larger majority of instances, the indications for treatment are nothing further than the removal of the organic lesion in the nose. In certain instances, however, where after this has been successfully accomplished, the sense of smell is found still notably impaired, it becomes necessary to resort to measures for its restoration. For this purpose, we may use in a routine way, perhaps, preparations of strychnine, arsenic, phosphorus, or any of the ordinary remedies, which are supposed to possess specific properties in restoring tone to the nerves. I confess that I have never seen any directly recognizable good results, from the administration of any of these drugs. Mackenzie<sup>1</sup> advises the local administration of strychnine, by means of insufflation, giving from one-twenty-fourth to one-sixteenth of a grain twice daily. It should be borne in mind, that the alkaloids are absorbed by the nose with more readiness even than by the stomach, and that the full physiological effect of the drug is thus obtained almost as rapidly as by means of a hypodermatic injection. Notta<sup>2</sup> suggests the use of local insufflation of powders containing veratria, in the proportion of one to one hundred and twenty.

Our most reliable measure, however, will be the use of the galvanic current, commencing with daily applications of a weak current, and increasing the strength according to tolerance. In some cases, faradization will give even better results than the continued current. I think in many cases, where the nerve has become enfeebled by long-continued disease, we may stimulate it into functional activity, by forcing it, as it were, to fulfil its normal duties. This can be accomplished by using not irritating but agreeable odors, of as powerful a kind as are easily obtainable, and frequently changing them. The choice of odors will be such as the patient's fancy may dictate, but these should be frequently changed, a half-dozen different ones being used in the course of the same day, and applied frequently, first to one nostril and then to the other. In this way, we may obtain even better results than by the use of electricity, or the internal administration of strychnine, or the other nervines.

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<sup>1</sup> "Diseases of the Throat and Nose," American Edition, Philadelphia, 1884, vol. ii., p. 461.

<sup>2</sup> Loc. cit.



## CHAPTER XVIII.

### DEFORMITIES OF THE NASAL SEPTUM.

DEFORMITIES of the nasal septum, either as a result of traumatism or inflammatory action, are probably the most frequent of all the exciting causes of catarrhal inflammation in the nasal mucous membrane. Hence it becomes a matter of no little importance that we should thoroughly appreciate, not only their method of development, but also the rationale of their action upon the lining membrane of the nasal cavities, as well as their influence upon its respiratory functions.

In health, we find the nasal septum presenting simply as a bony and cartilaginous wall, dividing the nasal passages into two symmetrical cavities. It thus possesses no very important function in the economy, although on its upper portion there is found a site for the distribution of filaments of the olfactory nerve, while in the lower and posterior portion we find imbedded in the mucous membrane certain vascular structures, which probably contribute somewhat to the great respiratory function of the nose. In diseased conditions, however, we find present in this structure certain abnormalities of contour, which undoubtedly have a marked influence in the production of an ordinary catarrhal inflammation. The first to recognize a deformity of this structure was Quelmalz,<sup>1</sup> who described septal deflections, attributing their existence to the habit of putting the finger into the cavity.

Morgagni,<sup>2</sup> making a more special investigation of these parts, attributed the deflections which he found, to excessive growth of the septum, as a result of which it became too large to fit in its bony framework, thereby becoming warped.

Coming down to our own day, we find Theile<sup>3</sup> making a statistical study of the subject. He examined 117 skulls, in only twenty-nine of which was the septum symmetrically placed. Similar results were obtained by Semeleder, who, in examining forty-nine skulls, found the septum bent to the left in twenty, to the right in

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<sup>1</sup> "Programma de narium earumque septi incurvatione," Lipsiæ, 1750, p. 7.

<sup>2</sup> "De sedibus et causis morborum," i. xiv., 16. Batav., 1767.

<sup>3</sup> Zeitschrift für rationelle Medizin, 1855, Neue Folge, vol. vi., p. 242.

fifteen, and a sigmoid deformity in four, while Harrison Allen,<sup>1</sup> in fifty-eight skulls, found narrowing of the left side in nineteen, and of the right side in twenty-one; in six of the latter, there was contact between the superior and middle turbinated bones and septum.

These statistics are all based on an examination of the dry skull, where, it should be remembered, there may be a source of error due to the warping which is liable to take place in thin bones. Zuckerkandl,<sup>2</sup> who has made perhaps the most thorough study of this subject, bases his statistics largely, I take it, on an examination of the cadaver, which I think unquestionably affords us more accurate data. Out of 370 crania, he found 123 symmetrical and 140 asymmetrical nasal septa. Of the last, the septum was deviated to the right in fifty-seven cases, to the left in fifty-one, and was sigmoid in thirty-two.

Loewenberg<sup>3</sup> after examining several hundred skulls, makes the statement, that only in about one case in seven do we find the septum absolutely straight in all its parts, while Mackenzie,<sup>4</sup> in an examination of 2,152 skulls in the museum of the Royal College of Surgeons, found 1,657 cases in which the septum presented in a more or less asymmetrical position. In 834, the deviation was toward the left side, in 609 toward the right, in 205 the deflection was sigmoid in character, while in five the irregularity was what he called zigzag. It is noticeable here, that the examination of the dry skull shows a percentage of deviation in seventy per cent and upward, of the cases examined, while the study of the cadaver brings this percentage down to less than forty per cent, as in Zuckerkandl's investigations. The probable source of error here, has already been suggested. A study of the living subject gives us still further information, Heymann<sup>5</sup> going so far as to state that ninety-nine per cent of all cases examined will show deformities. This would seem rather an extravagant statement. If we only recognize those deformities which give rise to morbid symptoms, certainly this percentage should be very much reduced.

A notable difference as regards race is observed by Zuckerkandl, in that one hundred and three of his cases were barbarous or semi-barbarous people, and in these only twenty-four were asymmetrical. This observation was confirmed by Mackenzie, who in four

<sup>1</sup> American Journal of Medical Sciences, Jan., 1880, p. 70.

<sup>2</sup> "Anatomie der Nasenhöhlen," Wien, 1882, p. 45.

<sup>3</sup> "Anatomical Researches on Deviations of the Nasal Septum," Archives of Otology, vol. xii., No. 1, March, 1883, p. 25.

<sup>4</sup> "Diseases of Throat and Nose," American Edition, Philadelphia, 1884, vol. ii., p. 424.

<sup>5</sup> Sixtieth meeting of the German Naturalists and Physicians, 1887.

hundred and thirty examples of symmetrical septa, found only 22.6 per cent in the superior races. Harrison Allen also found, in ninety-three skulls of negroes, deformity of the septum in only 21.5 per cent.

CLASSIFICATION.—Various classifications have been made, based largely on the character of the deviation, which occurs both in the bony and cartilaginous portions of the septum. Thus Loewenberg divides these cases into vertical, horizontal, and irregular deviations, and the horizontal subsequently into superior horizontal and inferior horizontal. Other classifications have been made by John Mackenzie,<sup>1</sup> and Ingals.<sup>2</sup>

When we remember that no two of these cases are alike, it would seem that any attempt at classification is immediately confronted with obstacles, which are difficult to overcome. Furthermore, its practical value is not very obvious. In a general way, we find the nasal septum, as the result of a fracture, presenting certain typical appearances which are easily recognized. Thus we may have the cartilage of the septum broken in the vertical line in such a way that the projecting ridge presents in one passage, with a corresponding depression in the opposite side. More rarely, we have the cartilaginous septum broken in a line more or less nearly approaching the horizontal. These fractures occasionally involve the vomer in such a way that the horizontal ridge extends through both the cartilaginous and bony portions of the septum, examples of which are seen in Figs. 82 and 83. In another class of cases, the injury results in a dislocation of the articulation between the vomer and the superior maxillary bone in such a way that the lower border of the septum is shifted, as it were, to one side, thus encroaching on the lumen of the nares. Here we have Loewenberg's lower horizontal deviation as seen in Fig. 84. Another form of deviation is what has been described by many writers as sigmoid, shown in Fig. 85, a condition which would seem to confirm Morgagni's view as to redundancy of growth. Here we have the lower portion of the cartilaginous septum and vomer bulging on one side, while above the perpendicular plate of the ethmoid, and the upper portion of the vomer, it turns to the opposite side, as a rule, coming in contact with the middle turbinated bone, thus involving largely the anterior two-thirds of the septum. Again the whole cartilaginous and bony septum may bulge, as it were, into one or the other cavities, as seen in Fig. 86, giving the impression, of its being too large to fit into its bony framework. A deflection involving

<sup>1</sup> "Deflection of the Nasal Septum and its Treatment," Trans. Med. Society of Virginia, 14th session, 1883.

<sup>2</sup> "Deflections of the Septum Narium," Arch. Laryngology, vol. iii., No. 4, p. 291.



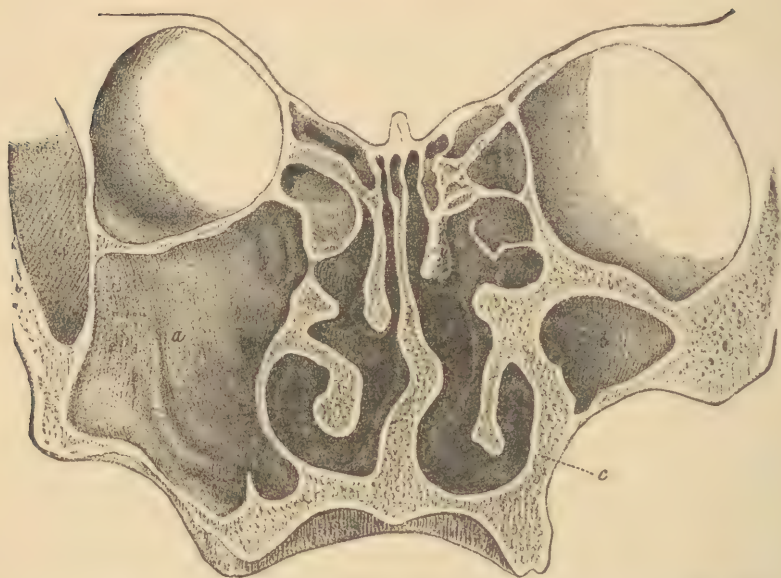


FIG. 82.—Horizontal Deviation of the Septum, probably the result of a Fracture. (Zuckerkindl.)

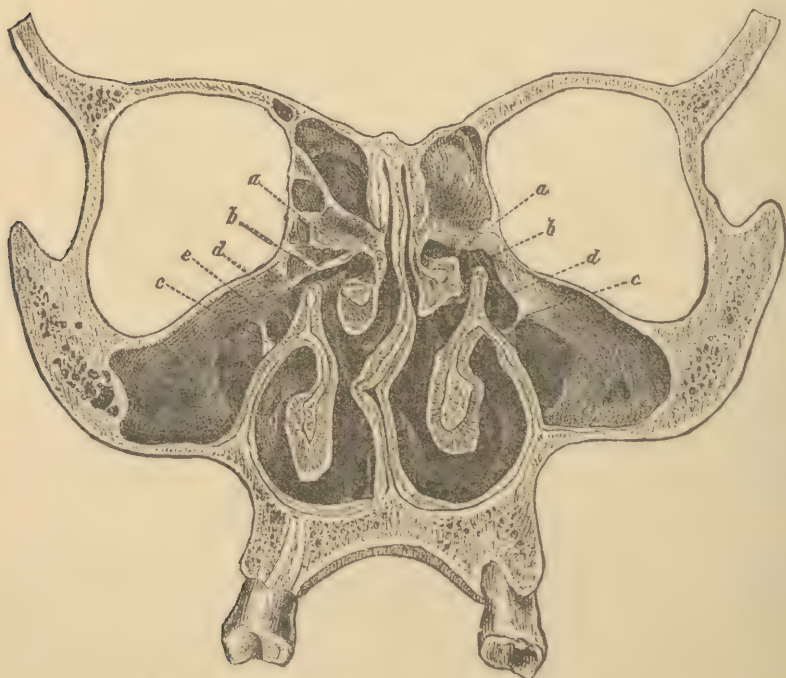


FIG. 83.—Horizontal Deviation of the Septum. (Zuckerkindl.)

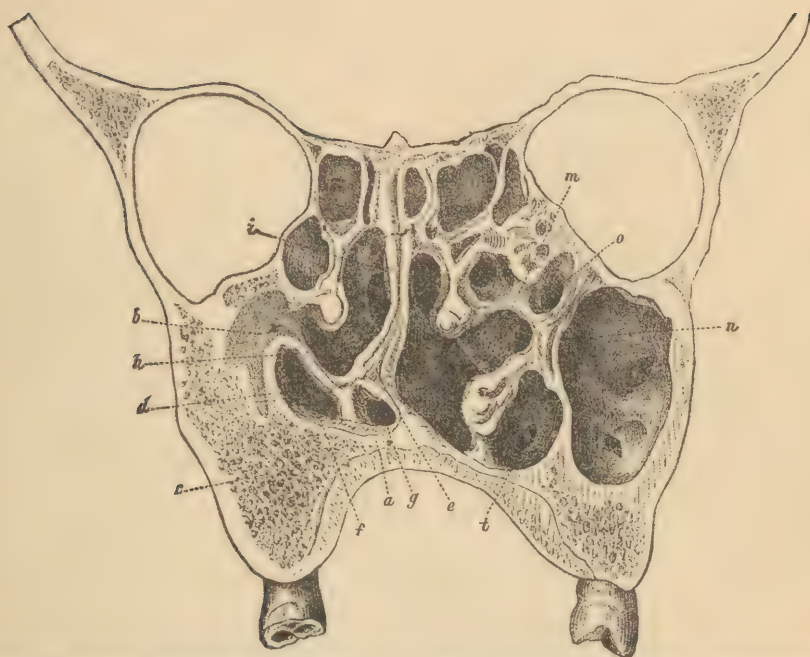


FIG. 84.—Dislocation between the Lower Border of the Septum and the Superior Maxilla. (Zuckerkindl.)

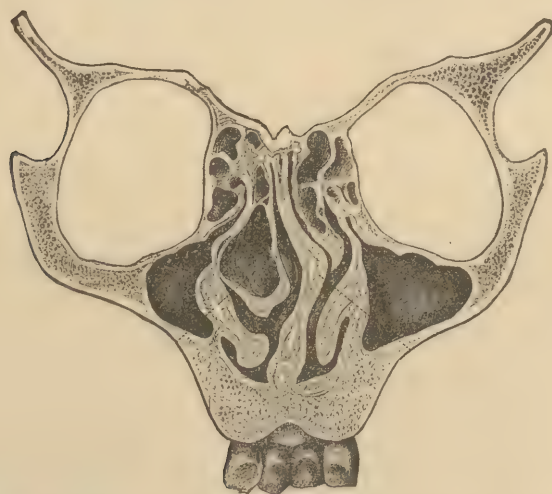


FIG. 85.—Sigmoid Deflection of the Septum, probably the result of Fracture. (Zuckerkindl.)

the posterior extremity of the vomer I have never seen. Schaus,<sup>1</sup> however, has found the deflection extending to the posterior nares, producing asymmetry in these openings. He bases his observation on digital examination rather than on rhinoscopy. It is characteristic of all these deviations, that, in every case, an angular or a rounded projection of the septum into one nostril, is attended with a corresponding depression on the opposite side.

In addition to this, we find a large number of cases, in which there is present a more or less prominent deformity on one side of the septum, which is not accompanied by this corresponding depression. This condition is always found along the sutural lines

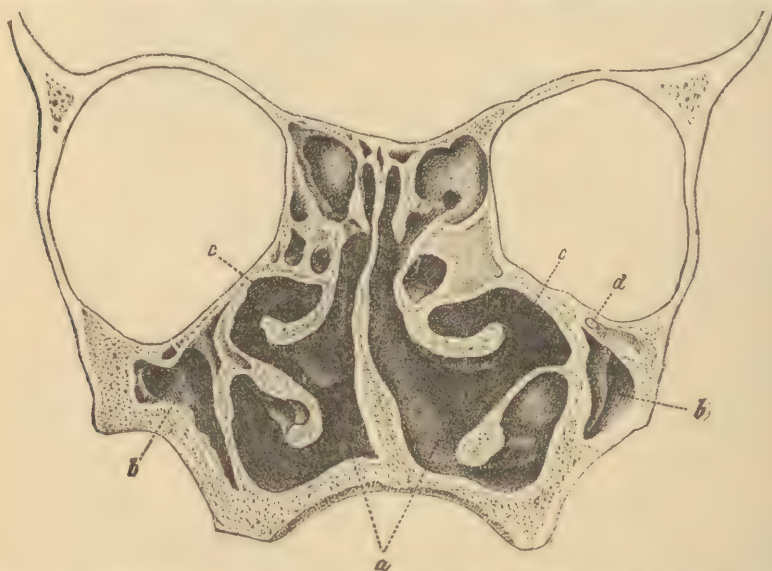


FIG. 86.—Bulging of both Cartilaginous and Bony Portions of Septum into Right Nasal Cavity. (Zuckerkindl.)

of the septum, and consists in a more or less well-developed angular prominence or ridge, which, projecting into the nasal passage, acts to obstruct normal respiration. These ridges are found, *first*, and most frequently, along the junction of the vomer with the superior maxillary bone; *second*, along the junction of the anterior border of the vomer with the cartilage of the septum; *third*, along the whole of the anterior border of the vomer, including its union with the cartilage of the septum, and the posterior border of the perpendicular plate of the ethmoid; *fourth*, and most rarely, at the junction of the cartilage of the septum with the perpendicular plate of the ethmoid. In most instances, these ridges are confined to one

<sup>1</sup> Archiv für klin. Chirurgie, Band 35, Heft 1, 1887.



side of the septum. In other cases, we find them occurring symmetrically on either side of the suture, thus constituting a condition, not properly classified under deviation or deflection of the septum. These were first described by Langenbeck<sup>1</sup> who gave to them, mistakenly I think, the name *exostoses*, a term which is frequently used even at the present day. Subsequently they were recognized and described by Theile, Harrison Allen, John Mackenzie, Zuckerkandl, and others.

ETIOLOGY.—The causation of these deformities has been the subject of no little discussion, and various theories have been advanced to account for their occurrence. As regards those deviations which are due to fracture of the septum, of course there can be no question, they are due to a direct blow upon the nose. When we come, however, to discuss the causes of the sigmoid flexure, or unilateral bulging of the septum, as also the sutural ridges, a pretty large field for discussion is opened up. Quermalz<sup>2</sup> believed that deviations might be produced by the action of astringents, drying up the membrane, causing it to contract, and thus drawing the cartilage down upon itself, a view also entertained by Schultz. Cloquet<sup>3</sup> obscurely states that these deviations are due to some defect in the primary laws of organization. Allusion has already been made to Morgagni's view, that these deflections are due to excessive development of the vomer. This also was advocated by Chassaignac.<sup>4</sup> In the same line is the view that the septum may be crowded up by a highly arched palate, a view suggested by Trendelenberg,<sup>5</sup> who first called attention to the frequent association of these two conditions. Jarvis<sup>6</sup> has reported four cases in which this association occurred, all in the same family, which would seem to suggest that there might be an hereditary or systemic habit pre-existing, to account for the bony deformity. According to Schaus<sup>7</sup> and Welcker,<sup>7</sup> certain abnormal conditions of facial development are frequently associated with deformities of the septum. The first investigations in this line were made by Welcker,<sup>2</sup> who describes certain changes in the shape of the anterior nares, occurring in cases of septal deformity, which from their resemblance to the shape of the elm leaf, he denominates as *pateleorrhin*. In this condition, the two nares are asymmetrical, one being wider in a horizontal and the other in a vertical diameter.

<sup>1</sup> "Handbuch der Anatomie," Göttingen, 1842.

<sup>2</sup> Loc. cit.

<sup>3</sup> "Osphrésiologie," Paris, 1821.

<sup>4</sup> Bulletin de la Société de Chirurgie, 1851-2.

<sup>5</sup> Cited by Schaus, loc. cit.

<sup>6</sup> New York Med. Record, March 14th, 1885.

<sup>7</sup> "Die Asymmetrie der Nase und des Nasen-Skelets," Stuttgart, 1882.

The less deeply cut nostril and the deviation of the crista nasalis always lie on one and the same side. Welcker also found, that, in the large majority of these cases, there was deformity of the nasal bones, and that the less deeply cut nostril lay on the side to which the bones deviated. While Welcker's investigations show essentially a difference in shape of the external nose and of the nostrils, in cases of septal deformity, Schaus's observations go to show that, in a large number of these cases, there is a faulty development of a large part of the facial skeleton. In other words, we may have scoliosis, as it were, of the whole face. The orbits may lie on different levels, thus giving rise to serious ocular trouble. The most marked changes, however, are seen in the development of the superior maxillæ. The palatine arch is always high, the alveolar processes, instead of forming a wide arch, come together at a comparatively acute angle, the incisor teeth frequently overlap, the palate is asymmetrical, the smaller half corresponding to the narrower nostril, and the alveolar processes are of unequal length, the longer alveolar process usually lying on the side to which the septum deviates. The cause of the deformity Schaus believes to be a faulty development of the facial skeleton, in exactly what manner it is impossible to say. With reference to rachitis as a possible cause, he says that the majority of the cases are not rachitic. Notwithstanding this conclusion, I think Schaus has drawn such a graphic picture of a rachitic case, that we must differ with him as to the conclusion, and say that where these conditions present, we have to do with a case of mollities ossium. This, however, explains but a very small proportion of cases which we observe.

Now with regard to these various views, I think a larger clinical observation would lean to the view, that traumatism is by far the most frequent direct cause of septal deformities. The clinical history of many of these cases affords direct evidence of this, and even in those cases in which the direct injury is not testified to, I think it safe to say, that an injury has occurred, which may have been of so slight a character as not to have excited especial attention at the time of the occurrence. An injury to the nose need not necessarily give rise to the immediate development of a notable deformity, as in fracture, but it may set up a low grade of morbid action, which going on through a number of years, will finally develop a condition by which the normal function of the nose is seriously hampered. In childhood or infancy while the parts are soft and delicate, and probably specially susceptible to injury, a fall on the face occurs, which perhaps ruptures some of the sutural attachments of the septum, or perhaps jams the septal cartilage against the vomer or perpendicular plate of the ethmoid, in such a

way as to cause a low grade of inflammatory action. This morbid process developing slowly, results in an angular spur, we may say, along the anterior border of the vomer; possibly after five or ten years, or more, this will have attained sufficient size to cause notable obstruction to breathing, which, in a manner discussed in a former chapter, sets in play new forces, which, after the lapse of another long period of time, result in a chronic hypertrophic inflammation of the nasal mucous membrane. The point which I would particularly emphasize in this connection, is that, in the first place, the morbid lesion results from a slow process of development, and, secondly, that the catarrhal symptoms which ensue, develop only after another long lapse of time; the original injury, which has set in play all these forces, occurring in infancy or childhood. Zuckerkandl<sup>1</sup> has shown us, that deformities of the septum never occur under seven years of age, while Welcker saw none before the fourth year. This, however, does not controvert the views that I advance, for, as I say, the injury may occur before either of these ages, without resulting in any notable deformity for many years later. Of course, these observations do not refer to fracture of the septum, which undoubtedly may occur at a very early age. Furthermore, these deformities, as the result of traumatism, although rarely, still do occur very early in life, for my own recorded cases show one operated upon at three years of age, and another at five.

That inflammatory action plays some part in the deformities is borne out by a histological investigation of the masses removed. Thus in Fig. 87 is shown an illustration of the microscopic appearance in a case of sutural ridge removed by means of the saw, in which the perichondrium shows well-marked evidence of inflammatory action. This may be contrasted with a similar specimen shown in Fig. 88, probably of longer standing, in which the inflammatory process, if it ever existed, has entirely subsided. That the injury may occur without the clinical history of traumatism, is very clearly shown by Robertson,<sup>2</sup> who, in an examination of two hundred and forty cases, found abnormalities of the nose in two hundred and seventeen, while there was a clinical history of injury in but eighty-three cases.

That traumatism plays an important part in the causation of these deformities is the view adopted by Zuckerkandl,<sup>3</sup> who, however, does not explain further the special method of their development. Miot,<sup>4</sup> however, basing his conclusions on a microscopical

<sup>1</sup> Op. cit., p. 45.

<sup>2</sup> Trans. Am. Laryngol Soc., 1885, p. 104.

<sup>3</sup> Op. cit., p. 48.

<sup>4</sup> "Remarques sur certaines obstructions nasales," *Revue Mensuelle de Laryngologie*, May, 1888, p. 245.



examination made by Duret, finds that these prominences consist essentially of plastic infiltration, thus establishing the fact that they

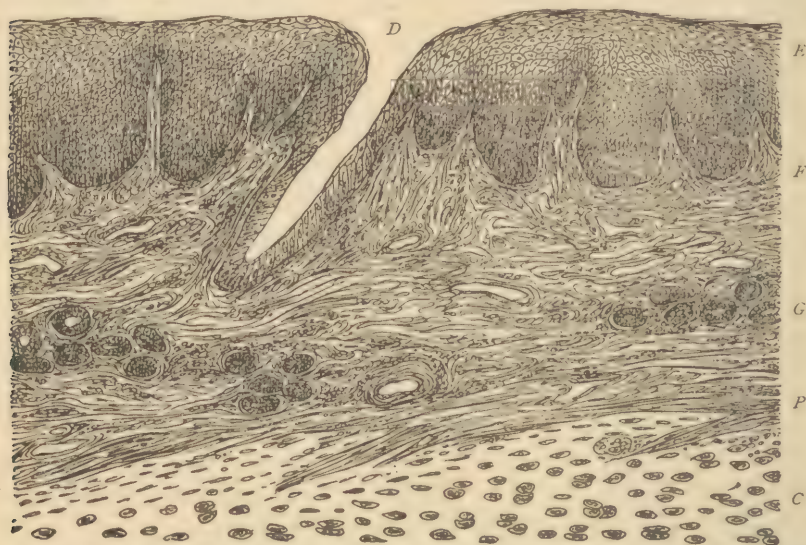


FIG. 87.—Transverse Section of Deformity of the Septum. *D*, Duct of mucous gland; *E*, stratified epithelium thickened, *F*, hyperplastic fibrous connective tissue due to subacute inflammation, *G*, acinous mucous glands, scanty; *P*, perichondrium, thickened by chronic plastic perichondritis; *C*, hyaline cartilage.

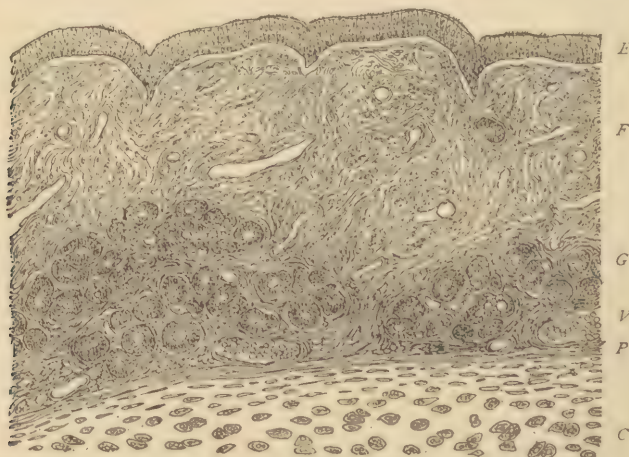


FIG. 88.—Transverse Section of Deformity of the Septum. *E*, Ciliated columnar epithelium; *F*, capillary blood-vessel; *G*, acinous mucous glands; *V*, large vein; *P*, perichondrium; *C*, hyaline cartilage.

are inflammatory in their origin, constituting true perichondritis. Bresgen,<sup>1</sup> Volkmann,<sup>2</sup> Onodi,<sup>3</sup> Gottstein,<sup>4</sup> Hopmann,<sup>4</sup> Heymann,<sup>4</sup> and

<sup>1</sup> Wien. Med. Presse, Nos. 7, 8, 1887.

<sup>2</sup> Sixteenth Congress of the German Surgical Society.

<sup>3</sup> Sixtieth meeting of German Naturalists and Physicians.

<sup>4</sup> Idem.

others, content themselves with simply assigning a traumatic origin to most cases, which would seem to indicate that the deviation occurred at the time of the injury. The point on which I would lay special emphasis, is that the deformity is primarily the result of traumatism, and secondarily of a slow inflammatory process, which results therefrom. Combining the views of the writers above quoted, with the investigations by Duret, who has so clearly shown them to be due to an inflammatory process, I think this view is still further strengthened by the investigations of Zuckerkandl,<sup>1</sup> who has shown that, in many cases, there lies between the perpendicular plate of the ethmoid and the superior border of the vomer a narrow strip of cartilage, apparently due to incomplete ossification of the temporary cartilages. Zuckerkandl thus accounts for the prominent ridges which are seen running from the nasal spine to the rostrum of the sphenoid. Those spurs or ridges which run along the lower border of the vomer, at its junction with the superior maxillary, probably, in many cases, occur at the time of the original injury, although here we must undoubtedly recognize the fact, that a chronic inflammatory process contributes much to their subsequent development into more prominent deformities.

How far syphilis is involved in the causation of these deformities, is rather a nice question. My own impression is that all syphilitic lesions in the nasal fossæ run a somewhat rapid course, and develop very soon into ulceration with necrosis, although Trélat asserts that many cases are of syphilitic origin. Rickets has been supposed by some, notably by Loewy,<sup>2</sup> to be the cause of septal deformities. No doubt deformities of the septum are frequently associated with rickets, in the same manner that facial deformity is so associated. There is, however, no good reason for supposing this to be an exciting cause. With reference to the curious facial deformities noticed by Schaus and Welcker, in connection with deformities of the septum, it might be stated that Ziem<sup>3</sup> has shown by a series of experiments, that occlusion of one nostril in young animals, will produce similar facial deformities. It is a question, therefore, whether deviations of the septum may not play a certain part in the causation of facial deformity, instead of being only a concomitant condition or a result.

Most writers mention the fact that septal deformities may be congenital. This is undoubtedly true, as the child in utero, as well as in the process of delivery, is not exempt from traumatism of a sufficiently violent character to do no little damage to the delicate tissues which form the nasal septum.

<sup>1</sup> Op. cit., p. 44.

<sup>2</sup> Berliner klinische Wochenschrift, 1886, No. 47.

<sup>3</sup> Monatsschrift für Ohrenheilkunde, 1883, Nos. 2, 3, 4, and 5.

SYMPTOMATOLOGY.—From an objective point of view, nasal deformities may occasionally be recognized by a deformity of the external nose. This may show itself in two forms. In the one form we have what Welcker<sup>1</sup> calls a scoliotic nose, in which the nasal bones are displaced in one direction, while the tip of the nose is turned toward the opposite side, thus forming an angle at their point of junction. In the other form, the whole nose is deflected bodily to one side. These external deformities may be so marked as to notably disfigure the face, or of so slight a character as to escape observation. It is worthy of note, that deformities of the external nose are of far more frequent occurrence than is generally supposed, for if we examine a given number of individuals with a plumb line, we will find the tip of the nasal organ deviating from the median line of the face, in quite a large proportion of cases.

A third external deformity might be mentioned, which consists in a lack of symmetry of the two nostrils, met with in connection with deflection of the lower border of the cartilaginous septum, or displacement of the columnar cartilage, producing distortion of the *columna nasi*. In addition to these, there may be present, in a certain proportion of cases, the peculiar facial expression of nasal stenosis, which is more fully discussed in connection with hypertrophy of the pharyngeal tonsil.

Subjectively, the primary symptom to which these deformities give rise, is simple nasal stenosis, with interference with normal nasal respiration. Secondly, however, there is set up in the nasal fossæ, as the direct result of the deformity, a series of changes in the nasal mucous membrane, which so far interfere with its functions as to produce symptoms referable to the whole upper air-tract, constituting what is popularly designated as a chronic nasal catarrh. As already stated, I regard septal deformities as responsible, in the large majority of cases, for the whole train of symptoms, direct and indirect, which are embraced under the very general term of chronic nasal catarrh, or to give it a more specific name, chronic hypertrophic rhinitis. The methods by which this develops, is so thoroughly discussed in the chapter on hypertrophic rhinitis, that it needs but a brief reference here. As the result of stenosis, either in one or both nares, the air immediately behind the point of deflection is rarefied with each act of inspiration, consequently the soft spongy membrane covering the turbinated bones is subjected to a sort of dry cupping process, as it were, by which its vessels become permanently dilated as time progresses. The direct result of the chronic hyperæmia is, naturally, increased nutrition; all the nutritive processes of the membrane become stimulated to such

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<sup>1</sup> Op. cit.



an extent, that the membrane grows rapidly in all its parts, and becomes notably thickened; this thickening being due to an increase in the calibre of the blood-vessels, together with a deposit of connective tissue in the intervenous tissues. We thus have established all the elements necessary to the production of what we call a chronic catarrh. If the deformity has been such as to completely occlude one nostril, the function of the membrane in that passage is naturally abolished, and the membrane itself collapses, and is seen to be in an almost bloodless condition. It is necessary for the development of these hypertrophic changes that air should pass through the fossa. We therefore find it an invariable rule, that the greatest extent of hypertrophy develops on that side which is most open, for in no case of a deflected septum is the extra width of the one passage competent to supply the deficiency of the other. In other words, the combined calibre of the two nasal passages, where deformity of the septum exists, is unequal to the purpose of the normal respiratory function. We thus find in those deflections characterized by prominence on one side, and concavity on the other, that the turbinated tissue on the concave side not infrequently grows out, as it were, into enormously enlarged masses, fitting themselves into the concavity of the septum. The statement is made by Baumgarten<sup>1</sup> and reiterated by Seiler<sup>2</sup> that these deflections are produced by the hypertrophy of the turbinated tissues. I am disposed to think that these writers have mistaken cause for effect; for, if this were true, in those cases in which we have notable hypertrophy of both turbinated bodies to the extent of contact with the septum, as suggested by Lowey,<sup>3</sup> we should naturally expect to find atrophy of the septum or, as Bresgen<sup>3</sup> suggests, even perforation.

Where the deformity produces stenosis in or near the nostril, a sinking in, during the act of inspiration, of the ala of the nose will often be noticed. The air entering the narrowed orifice in a rapid current, according to the extent of the stenosis, causes the nostril to collapse, in many cases producing complete occlusion. Deformity of the septum, probably more than any other single cause, gives rise to attacks of epistaxis, due to the fact that the irregularities of the surface of the septum present certain prominences, which are exposed to the ingoing current of air, laden with particles of dust and other impurities, whose action is something in the nature of the sand blast. These small particles, striking against these prominences, cause minute erosions, by which the mucous membrane is

<sup>1</sup> Deutsche Med. Wochenschrift, 1886, No. 22, p. 313.

<sup>2</sup> New York Med. Journal, Feb. 18th, 1888, p. 180.

<sup>3</sup> Loc. cit.

broken, the walls of the capillaries are denuded or injured, thus becoming the source of more or less violent and profuse attacks of hemorrhage without apparent cause. Again the symptoms may arise from the habit of the patient of picking off with his finger the small crusts or scabs which form.

The prominent subjective symptoms, then, of a deflected septum, are catarrhal inflammation of the nasal mucous membrane, with its resultant laryngitis, bronchitis, the various forms of otitis, asthma, hay fever, etc. A very notable symptom in those cases, and one which I regard as almost pathognomonic of deflection of the septum, is alternating stenosis of the two passages, by which, while the one side may be completely stopped, the other will seem to be quite pervious, followed rapidly by the vice-versa condition. This, of course, is only met with in those cases where the deformity produces partial occlusion of either passage, but it seems to me, it strengthens in a very notable manner the line of argument followed above, in explanation of the method of development of symptoms, for I think that the first morbid lesion which results in the nasal mucous membrane from septal stenosis is dilatation of blood-vessels, with a weakening of their muscular coat, thereby inducing a tendency to the occurrence of sudden turgescence, either in the one side or the other, under which the muscular control of the calibre of the blood-vessels on one side is maintained for a short period, followed by a sudden letting go, as it were, and their filling, with the concomitant relief of the opposite side. The stenosis, it must be borne in mind, is produced by a swelling of the mucous membrane both on the turbinated bones and on the septum. That there is a connection between the two sides is well shown by the fact, in these cases, that when lying down, a complete closure of the upper passage in the recumbent position may be relieved by the blood sagging down, as it were, into the tissues of the lower fossa.

The voice may be affected by a deformity of the septum in two ways. Its tone is impaired in much the same way as it is in hypertrophic rhinitis, from the fact that the nasal chambers, which play so important a part in the production of the overtones, are to an extent closed. The voice, therefore, loses to a degree its nasal tone, and is thereby weakened. The speaker, in his effort to supplement this deficiency, is liable to strain the vocal muscles, thus producing either laryngeal hyperæmia, or what many writers call *mogiphonia*, *i.e.*, impairment of voice. A still further source of impairment of voice is in the catarrhal condition of the larynx and trachea, which sooner or later develops in connection with hypertrophic rhinitis, to which the septal deformity may give rise.

A still further symptom, which is frequently observed in these

cases, is met with where the deflection occurs in the region of the middle turbinated bone, producing a narrowing of the middle meatus by which this rarefaction of the inspired air acts more forcibly on the middle turbinated tissues. As a consequence, we have developed conditions which present certain characteristics resembling the nasal neuroses, by which sneezing with watery discharges becomes a prominent feature of the trouble. The explanation of this is in the fact that we have here a nerve supply, enriched by the distribution of the terminal filaments of the olfactory nerve, and thus a hyperæmic condition of the membrane renders it more delicately sensitive. It is in these cases, moreover, that we not infrequently meet with hay fever, asthma and the other reflex neuroses, complicating intra-nasal disease.

The various ear-troubles already discussed, as dependent upon hypertrophic rhinitis, may equally well arise from septal deformities, but here I think, without question, we not infrequently find ear-symptoms developing, even before the catarrhal inflammation has progressed to any serious extent; the conditions which tend to develop impaired hearing, as already stated in the chapter referred to, being dependent rather on the nasal stenosis than on the inflammatory process, or its extension to the tympanic cavity. This point I regard as one of no small importance, for in a number of cases which have come under my own observation, I have seen very marked impairment of hearing completely removed by the removal of a septal obstruction in the nasal passages, where there existed no hypertrophic changes which required treatment. This would seem also to substantiate the opinion already expressed, that catarrhal disease of the middle ear is not necessarily due to an extension of the inflammatory action.

DIAGNOSIS.—Recognition of these deformities is based entirely on examination anteriorly, posterior rhinoscopy giving us absolutely no information. I fully concur with Mackenzie<sup>1</sup> that these deformities never extend to the posterior nares. An examination should be made with a good light, sunlight being used if possible, which should bring well into view any deviation from the normal line or contour that may exist, cocaine having first been applied, to thoroughly contract the mucous membrane, and open up the passage for thorough inspection. Care should be taken, in making this examination, to tilt the tip of the nose thoroughly to one side, so as to bring the plane of the normal septum into as nearly a direct right line with the observer as possible. The examination, of course, being made through both passages should enable us to

<sup>1</sup> "Diseases of the Throat and Nose," American Edition, Philadelphia, 1884, vol. ii., page 426.



recognize the extent and character of the deformity. Additional information is afforded by the use of a slender probe, wrapped with a small pledget of cotton, which is easily tolerated if the passage is thoroughly anæsthetized, and which can be passed over the septum as far as the deformity will permit, in such a way as to give much information. Seiler<sup>1</sup> has devised a septometer for measuring the thickness of the septum at various points, which may be of service, although much the same end may be accomplished by placing a speculum in each nostril, and while throwing the strongest light into one, observing the translucency of the tissue through the other. The shadows thus formed, and the opacities or semi-opacities thus displayed, often afford information which may be of value. The probe affords us a means of testing the character of the prominences which may exist, and solves the question as to whether they are bony or cartilaginous on the one hand, or glandular on the other, the vascular prominences being eliminated by the use of cocaine.

Zuckerkindl<sup>2</sup> has described a somewhat rounded mass of glands, first alluded to by Morgagni, which are found in a normal condition, in a line about opposite the middle turbinated bone, especially at its anterior extremity and about the lower margin of the olfactory region. Creswell Baber<sup>3</sup> describes this prominence as the tuberculum septi. It consists essentially of a mass of muciparous glands, soft to the touch, which need not lead to error in diagnosis. It would seem that the diagnosis of deformity of the septum would present few difficulties, and yet I have frequently had sent me patients with the diagnosis of nasal polypus, in which the red mass or face of the projecting portion of the deflected septum occluding the nostril, gave rise to this error. It need only be borne in mind that a polypus or fibroma is more or less freely movable on the impact of the probe, and soft to the touch, while the deflected septum is rigid and immovable. The same may be said of abscess or angioma of the septum. Enchondromata, ecchondromata, and exostoses also present a hard resisting mass to the probe, but these tumors are somewhat distinct from the septum. Furthermore they are among the rarest of diseases. Malignant disease possesses few characteristics which could possibly lead to any confusion in diagnosis. Syphilitic perichondritis presents a bulging mass on the septum, is bright red in color, somewhat soft to the touch, but presents evidences of active inflammatory action, which is rarely met with in connection with simple deformities.

PROGNOSIS.—Those cases which have not led to the develop-

<sup>1</sup> "Diseases of the Throat," Philadelphia, 1883, p. 83.

<sup>2</sup> *Op. cit.*, page 44.

<sup>3</sup> "Examination of the Nose," *Amer. ed.*, pp. 17 and 20.

ment of complicating disorders, such as catarrhal inflammation of the upper air-passages, ear-disease, etc., of course, only demand a restoration of the normal respiratory freedom for entire relief to symptoms. In other cases, in which, as the result of multiple fracture, the septum is crumbled, as it were, into a shapeless affair, complete restoration cannot be promised. Where ear-disease has set in without the interposition of a catarrhal rhinitis, the results of treatment are as a rule most gratifying. Where the symptoms developed are merely those of catarrhal inflammation of the upper air-passages, the successful operation on the nasal septum goes far toward giving relief to the catarrhal symptoms, and yet, as a rule, more or less subsequent treatment will be demanded for the relief of this condition. As regards the influence on the voice, where the voice has become impaired without the intervention of a rhinitis, its complete restoration may be promised by a successful operation. In hay fever and asthma, the course is so far complicated by other elements as to render our prognosis exceedingly uncertain, and yet where these neuroses exist in connection with a deformity of the septum, it is extremely doubtful if any relief can be afforded until the operation has been successfully done, and perhaps no single measure in these diseases gives more satisfactory results.

TREATMENT.—The essential feature of these deformities, which demands correction, is the stenosis, as from this, as has been shown, arise all the sequelæ and complications which accompany them. Where the deformity has occurred as the result of a fracture, this may be attempted, either by removing the projecting portion of the deviation, or by restoring the fragments to their normal plane. The earliest effort in this direction, of which we have knowledge, is the measure recommended by Quelmalz, who directed that the patient himself should, by digital manipulation, repeated many times during the day, press the parts, so far as possible, into their normal position, and hold them there. Dieffenbach<sup>1</sup> on the other hand, advised that the projections should be sliced off with a knife. A still more intricate procedure was adopted by Heylen,<sup>2</sup> who first dissected the mucous membrane carefully from the surface of the deformity, and then removed the projecting portion with scissors, thus seeking to preserve the mucous coating. Chassaignac<sup>3</sup> adopts a somewhat nicer surgical procedure, in first dissecting up the mucous membrane, and then making a number of incisions through the deflected portion, by

<sup>1</sup> "Die Operative Chirurgie," Bd. I. Leipzig, 1845.

<sup>2</sup> *Annales de la Soc. de Méd. d'Anvers, Gaz. Méd.*, 1847, p. 810.

<sup>3</sup> *Gaz. des Hôpitaux*, 1851. p. 420.

which it is rendered pliable, thus enabling him to restore it again to its normal plane, where it is maintained in position by the insertion of plugs into the cavity, until it has solidified. Ingalls<sup>1</sup> describes a still nicer manipulation, by which, after dissecting up the mucous membrane, he excises a V-shaped piece from the deflected cartilage, and subsequently brings the parts together by sutures, thus recognizing the redundancy of tissue which is usually present in these cases, while Heymann<sup>2</sup> removes the projecting portion by means of an ordinary carpenter's chisel, a method also adopted by Seiler.<sup>3</sup> Demarquay<sup>4</sup> still further complicates the operation by opening the cavity by an incision along the ridge of the nose, in the median line, for the purpose of gaining free access to the parts, after which he dissects the mucous membrane from the prominences, which he removes with a knife, and then unites the membrane over the part by sutures, subsequently closing his external wound in the same manner. A somewhat similar operation was done by A. C. Post, of New York, as quoted by Robinson.<sup>5</sup> He opened the nose externally by Dieffenbach's operation, by an incision along the alar fissure, while Richet, as quoted by Miot<sup>6</sup> opens the nasal cavity by separating the columna from the lip and also from the lower border of the septum, which is thus thoroughly exposed, enabling him to remove the projection. It need scarcely be added, that an operation which involves incision of the facial integument is rarely if ever justified for the relief of these deformities. Linhart,<sup>7</sup> going further, deems it necessary to dissect up the mucous membrane on both sides of a deflected cartilage before removing the projecting portion.

It will be noted that Quelmalz, Chassaignac and Ingall's operations are designed only for cases of deflected septum, while the others are done both for deflections and for those cases characterized by bony or cartilaginous ridges along the sutural lines, or by hypertrophy of the tuberculum septi.

An instrument which was based on a thorough recognition of clinical indications, was the punch devised by Blandin<sup>8</sup> shown in Fig. 89, which consisted simply of a modification of the ordinary shoe-punch, by the use of which he was enabled to remove one or more small discs of the projecting portions of cartilage. Blandin's idea was simply to ablate the projecting portion of the deflected

<sup>1</sup> Arch. of Laryngology, vol. iii., p. 297.

<sup>2</sup> Berliner Klinische Wochenschr., 1886, No. 20, p. 329.

<sup>3</sup> Loc. cit.

<sup>4</sup> Gaz. des Hôpitaux, 1859, p. 470.

<sup>5</sup> "Nasal Catarrh and Allied Affections," 2d ed., N. Y., 1885, p. 189.

<sup>6</sup> Loc. cit., p. 250.

<sup>7</sup> "Compendium der Chirurgischen Operationslehre," Wien, Braumüller, 1826, p. 516.

<sup>8</sup> "Compendium de Chirurgie," T. iii., page 33.



septum, recognizing the fact that the perforation did not necessarily constitute a morbid lesion. The punches designed by Ruprecht<sup>1</sup> and Roser<sup>2</sup> differ in no essential manner from that of Blandin.

The punch is easy of manipulation, and in many cases, where the deflection presents an angular prominence, accomplishes the

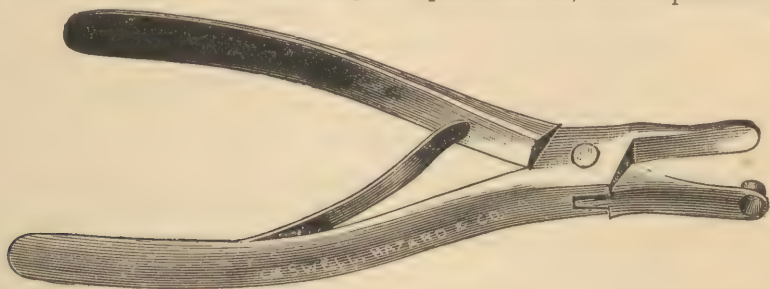


FIG. 89.—Blandin's Septal Punch.

purpose of removing the stenosis in a fairly satisfactory manner. Steele<sup>3</sup> has devised a punch (see Fig. 90) in which the cutting blades radiate from a centre, in such a manner as to produce a stellate incision in the septum. The object of this device is to produce a series of triangular flaps, which will allow of the deflected portion being brought down to the normal plane. John Mackenzie<sup>4</sup> gives priority in this device to Dr. James Bolton,<sup>5</sup> of Richmond, who published a case of deflected septum, which he operated upon by producing these stellate incisions by means of an instrument

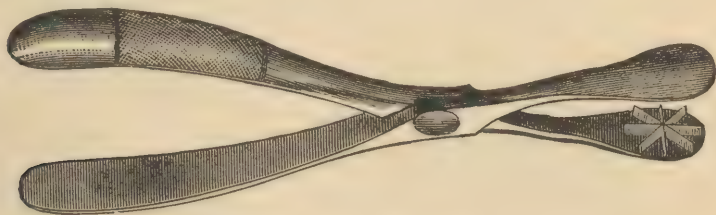


FIG. 90.—Steele's Septal Punch.

resembling a buttonhole-scissors, a better instrument, it seems to me, for accomplishing the purpose than Steele's punch, for in my hands, I have never been able with this instrument to make incisions sufficiently deep to render the septum pliable; although, as regards priority, the principle was first suggested by Chassaignac,<sup>6</sup>

<sup>1</sup> Wien. Med. Wochenschr., 1868, p. 1157.

<sup>2</sup> Berliner Klinische Wochenschr., 1880, No. 45.

<sup>3</sup> St. Louis Courier of Med., May, 1879.

<sup>4</sup> "Deflection of the Nasal Septum and its Treatment," Transactions of the Medical Society of Virginia, 14th Session, 1883.

<sup>5</sup> Richmond Med. Journal, vol. v., April, 1868, p. 241.

<sup>6</sup> Loc. cit.

who made use of the bistoury, which to me seems a more rational method than either the punch or the scissors, in that its movements can be directed in a far more intelligent manner. The operation which came most largely into vogue after its publication, was that of Adams<sup>1</sup> who advised that the septum should be seized with a forceps, shown in Fig. 91, and crushed, as it were, or refractured, in such a manner that it could be restored to its normal

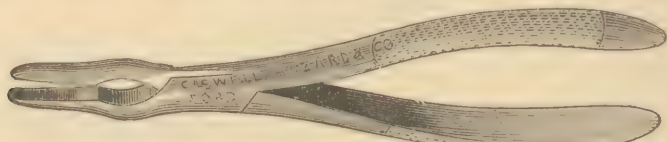


FIG. 91.—Adams' Forceps for Refracturing a Deflected Septum.

plane, after which a clamp (see Fig. 92) was to be worn, for a period of three days, followed by the use of a pair of ivory plugs (Fig. 93), which were to be worn during the day and removed at night, until firm union had taken place.

Jurasz<sup>2</sup> has modified this instrument, by combining forceps and clamps in a single instrument, in such a manner that, after crushing the septum, the handles are removed, leaving the clamps in position, to hold the fragments in a straight line.

Where there is considerable distortion of the external nose, due to a bending of its cartilaginous portion, I think Adams's operation is often indicated, as serving to remedy the facial deformity, although I think it is not usually successful in removing the stenosis, for it



FIG. 92.—Adams' Nasal Clamp.

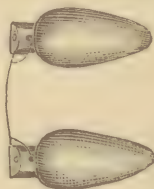


FIG. 93.—Adams' Nasal Plugs.

must be remembered that, where we have fracture of the septum, there is invariably a considerable degree of thickening at the point of the original fracture, which renders refracturing in this line almost impossible. Moreover, the operation is an exceedingly painful one, and the subsequent treatment in wearing clamps and plugs subjects the patient to a period of great discomfort and even suffering. Where the facial deformity involves a deflection or distortion of the nasal bones, Adams's operation is inadequate. I think

<sup>1</sup> British Med. Journal, October 2d, 1875.

<sup>2</sup> Berlin. Klinische Wochenschr., 1882, No. 4.

the prominent indication, both in deflections and deformities, is the removal of the projecting portion, and the restoration of the septum to a plane as nearly approaching the normal as possible. This indication was recognized by Dieffenbach, Heylen, Richet and most of the writers already quoted, but I think their operative measures, as a rule, were inefficient. In most of these cases, we encounter bone as well as cartilage, hence a knife is utterly inadequate to thoroughly remove the obstruction. The scissors, also, I think, fail in most cases, for the same reason. Furthermore, I deem it of the greatest importance, in removing these obstructions, that a thoroughly smooth surface should be left, for when a jagged, uneven surface remains, the result is unsatisfactory, and the period of healing occupies an unnecessarily long time. The device suggested by

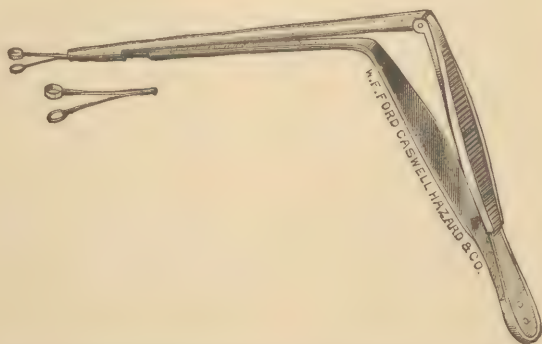


FIG. 94.—Jarvis' Cutting Forceps for the Removal of Septal Deformities.

Jarvis<sup>1</sup> of transfixing the projecting portion with a needle, and subsequently removing it by a snare, is open to the objection of leaving a jagged surface, and furthermore, his needle can only transfix cartilage, while I regard the removal of the bony projection as of even more importance. The same objection, it seems to me, lies against this writer's cutting forceps<sup>2</sup> shown in Fig. 94. Moreover this instrument is too fragile to serve an efficient purpose. The use of various forms of burrs, such as are shown in Fig. 95, operated by an ordinary dental engine, or the electro-motor, is advocated by Seiler<sup>3</sup> and others, while Holbrook Curtis<sup>4</sup> has devised a series of small trephines (shown in Fig. 96), which work by an electro-motor, whose use he advocates for the removal of deformities of the septum. The objection, I think, lies against these

<sup>1</sup> Arch. of Laryngology, vol. iii., p. 300.

<sup>2</sup> Medical Record, vol. xxvii., p. 167.

<sup>3</sup> "Diseases of the Throat," 2d ed., Philadelphia, 1883, p. 248 et seq.

<sup>4</sup> New York Med. Journal, May 28th, 1887.



devices, that they fail to leave a smooth, unbroken surface, which is a matter of no small importance.

For those cases which present a horizontal ridge projecting into the cavity from the lower portion of the septum. Seiler<sup>1</sup> in a later



FIG. 95.—Various Forms of Burrs for the Removal of Septal Deformities.



FIG. 96.—Curtis' Nasal Trephines.

publication advises cutting through the mucous membrane above and below the ridge, with a small knife, and subsequently removing the bone and cartilage by means of delicately constructed chisels or gouges (see Fig. 97) operated by the hand or by a small mallet.

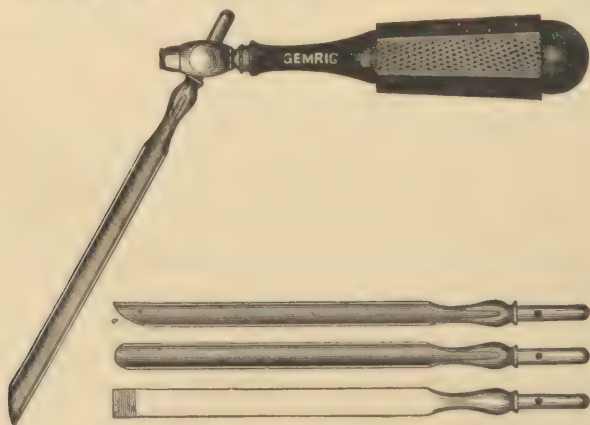


FIG. 97.—Seiler's Nasal Chisel and Gouges.

As giving a clean-cut surface, and going readily through both bone and cartilage, the saw would naturally suggest itself as an efficient instrument. Some years since, Woakes made use of this

<sup>1</sup> Op. cit., 3d ed., p. 320.

device, recognizing its value, and subsequently Seiler<sup>1</sup> recommended the use of a metacarpal saw for removing the bony projections, or "exostoses."

The essential features of a saw which will render its use feasible, are such thinness of blade, and fineness of teeth, as will enable it to enter the tissues even at an acute angle—in other words, that it shall take hold readily.

The instruments above noted, failing in my hands, I resorted to various devices for securing a proper model, till finally I had one constructed as follows: the blade as thin as possible, consistent with strength, one-eighth of an inch wide, five inches long, with a cutting edge of three inches, with thirty teeth to the inch, each tooth an exact equilateral triangle, with no cross-cut and no set to the teeth, the handle being three inches long, of sufficient size to be easily grasped by the hand, and attached to the blade at an angle of forty-five degrees, in order that the hand should in no way obstruct the view while operating. These saws were constructed in two forms, one with the cutting edge upward and the other with the cutting edge downward. This instrument (shown in Fig. 98) simply removes the presenting portion of deformities and deflections of the septum, the end in view being to cut as nearly as possible in the plane of the normal septum. In other words, to saw out a new septum, as it were, as one would saw a board from a log, removing those deformities which may be found in either fossa. When this instrument was first made public<sup>2</sup> I reported a series of one hundred and sixty-six operations. Since that time, I have made almost daily use of it, and regard it as by far the best device we possess, for the removal of these obstructions. The mode of operation is as follows:

First, with a Delano atomizer a twenty-per-cent solution of cocaine is sprayed into the nostril, both on the obstructed and on the open side. At the end of two minutes a probe, wrapped with cotton, is dipped into the same solution and swept over the projecting portion of the septum, the membrane being by this time so nearly anæsthetized as to tolerate a thorough probing. The cotton

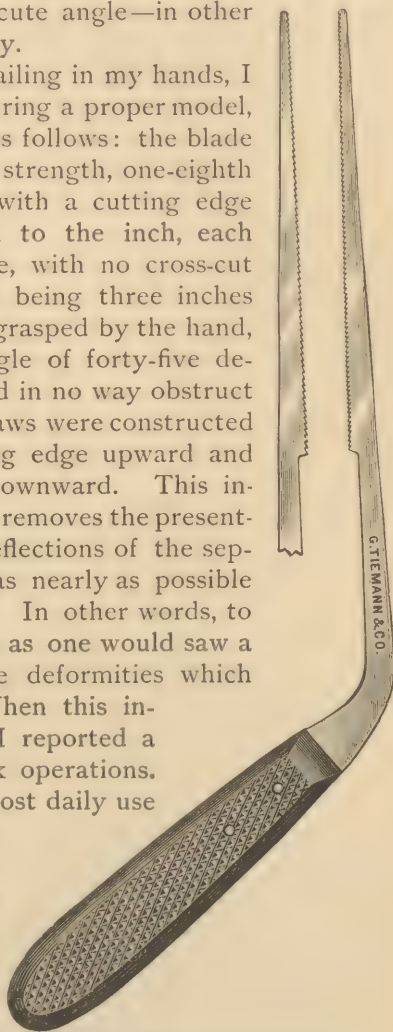


FIG. 98.--The Author's Nasal Saw.

<sup>1</sup> Op. cit., p. 254.

<sup>2</sup> N. Y. Med. Record, January 29th, 1887.

pellet is used to bring the cocaine in more thorough contact with the septum, and also for a more thorough exploration of the extent and character of the deviation. At the end of six minutes the parts are thoroughly anæsthetized. The saw is now introduced, and fixed in such a position that, in cutting, the whole of the projecting portion will be removed, the object being kept in view always to reduce the septum as far as possible to its normal outlines. In other words, it is to be sawed down, as we saw a board out of a log. After the instrument has entered, the sawing is done with as rapid a motion as it is possible to give the hand, care being taken to make a straight cut without bending the instrument. In this way the saw is carried directly down through both bone and cartilage until it emerges at the lower edge. Occasionally I have used the reverse manipulation, and sawed from below upward, where the deflection was of such a character as to interfere with entering my instrument well above the point where the projection bent from the median line.

After cutting, the piece is generally easily removed by the forceps, or, if not thoroughly cut through, it can be removed by slipping the loop of the snare over it. The bleeding is profuse for two or three minutes, but in no case have I had any serious annoyance from hemorrhage. In two instances, I think, I have been compelled to plug, but in only two. Hemorrhage is arrested by clot, and I simply direct my patient not to expel the clot for three hours, when I think all danger of hemorrhage has ceased.

In regard to the operation, in only a single case of all the operations which I have performed have I cut through the septum, which illustrates the fact of its marked thickness at the point of fracture, and, furthermore, explains why Adams's operation for straightening is so often unsuccessful.

Objection has been made to these operations that they result in ulceration. Now I wish to say, in as positive a manner as possible, that in no case have I had any such result. The subsequent treatment is nothing. The healing process requires no attention. The parts heal up kindly, and, as a rule, with no unpleasant symptoms during the process. It has been charged that bad cicatrices result. Again I say that I have seen no such result in any case. The mucous membrane reforms over the cut surface, and at the end of two months it would be difficult to recognize the fact that any cutting had been done. Too much importance cannot be laid on the necessity of a perfectly straight, smooth-cut surface. In one or two instances in operating I bent my saw, which is exceedingly flexible, in such a way as to make a hollow cut, sawing in a curve, as it were, leaving a depression on the surface of the septum. When-



ever I have made such a mistake there has been exceedingly great annoyance from delayed healing, owing to the fact that mucus and bloody pus accumulated in the depression and formed crusts, and thus markedly interfered with the healing process. And herein, it seems to me, lies an objection to the rougher operation of the gouge and the forceps in removing these obstructions, as leaving an irregular surface for the lodgment of mucus and secretions. This, however, does not form ulceration. We meet with no ulcerations in the nasal cavity, except as the result of syphilis or some blood-poisoning. Delayed healing may occur, but not ulceration, after the operation; and delayed healing, I am positive, can only be the result of unskilful operating.

I will only add, with regard to the operation, that it should always be done, if possible, with the use of sunlight or some equally powerful illuminator, as it is of the utmost importance that the movements of the saw should be kept under as close ocular inspection as possible, in order that the line of cutting shall not deviate from that of the plane of the normal septum, and this can only be secured by the aid of thorough and powerful illumination.

Roe<sup>1</sup> has attached the blade of this instrument to an electro-motor, claiming certain advantages for this procedure. It seems to me, a nicer manipulation and more accurate direction can be given by the hand. Dr. John B. Roberts has devised a somewhat ingenious operation, which consists in making a linear incision with the bistoury along the prominent line of a deflection, in such a manner as to enable him to press the parts into their proper position, after which he imbeds a long steel pin in the septal tissues in such a manner as to hold them in line, until they have become so far solidified as to maintain their position without this aid; if necessary, more than one pin being used. I have never been able to obtain Dr. Roberts's success by this method of procedure, although I have found these pins of great value in those cases in which we have a rounded bulging deflection, confined to the cartilaginous portion of the septum, and which is easily replaced by the forefinger, but springs back, as it were, the instant the pressure is removed. In these cases, firm pressure being made on the convexity of the deflection and the cartilage made to bulge on the opposite side, the pin is passed directly through the septum, and returned again at about a quarter of an inch beyond the first perforation, the head of the pin remaining on the side of the original concavity. In this manner the pin is not imbedded in the tissues, but remains really on the outside. An ordinary brass pin answers an excellent purpose, and remains in position a week or longer, giving rise to no

<sup>1</sup> Trans. of the Amer. Laryngol. Assoc., 1887, p. 241.

special inconvenience, and is removed when the parts have become fairly solidified. There is no objection to the loss of mucous membrane in any of the operations above alluded to, as this renews itself very rapidly, although many of the earlier operators, as will have been noticed, went to no small pains to preserve this, by dissecting it before removing the cartilaginous or bony obstructions.

In this connection should be mentioned the ingenious operation suggested by Dr. Weir, of New York, for correcting the facial deformity caused by a deflection of the bony portion of the external nose. These deformities are embraced under two general varieties. In the one, the bony frame-work is displaced laterally, while in the other the bridge of the nose is flattened, resulting in a bulging, as it were, of the two nasal bones. In the operation for lateral displacement<sup>1</sup> he commences, by making a bevelled incision a quarter of an inch long, immediately over the naso-maxillary articulation on the side toward which the displacement occurs. A small carpenter's chisel is then inserted, and the two bones separated through the whole length of the articulation. He then makes an effort to fracture the opposite articulation by digital manipulation, or prying with the chisel or by means of a forceps introduced into the nasal cavity. When this is accomplished, the nose is held in position by pads, secured *in situ* by adhesive plasters. In a subsequent article, Dr. Weir<sup>2</sup> describes a method of restoring a traumatic flattening of the bony portion of the nose, the steps of the operation being the same as those previously described, with the additional suggestion, that if necessary the chisel should be carried directly through the primary incision, to the opposite side of the nose, for the purpose of separating the entire maxillary suture of that side, where this is not easily fractured by the simpler manipulations before described. The two nasal bones are then brought into place, by crowding them together, and subsequently held *in situ* by a pin passed directly through both bones, and further strengthened by iodoform-pads laid on the outside.

#### DISLOCATION OF THE COLUMNAR CARTILAGE.

In addition to the deformities of the septum already described, two cases have come under my observation and have been reported in a former paper<sup>3</sup> in which the deformity was so peculiar that I give them somewhat in detail.

We find lying immediately below the cartilage of the nasal

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<sup>1</sup> New York Med. Record, March 13th, 1880, p. 279.

<sup>2</sup> Philadelphia Med. News, March 5th, 1887.

<sup>3</sup> "Illustrated Med. and Surg.," vol. i., p. 25.

septum, and parallel with its lower border, a small oblong plate of cartilage, not usually mentioned in our text-books on anatomy, the purpose of which seems to be to act as a support for the integument of the columna. This may be designated as the columnar cartilage.

The first case was that of a gentleman, who reported that for two years he had noticed something growing in his right nostril. The deformity, slight at first, had continued to increase, until when I saw him there was a considerable degree of closure of the nostril. The facial expression was considerably altered by the deformity, and also by the anxiety to which it had given rise. On examination, the columnar cartilage was found to be displaced laterally and at the same time tilted upward, in such a manner that the posterior angle projected upward into the nostril. It could be restored to position by pressure, but when this was relaxed the deformity reappeared. The appearance is well shown in Fig. 99.



FIG. 99.—Dislocation of the Columnar Cartilage of the Nose into the right nostril.

The second case presented no points of difference from the first, except that the deformity was on the left side, which would suggest that the cause of the affection was the pressure of the thumb in using the handkerchief, since the first patient was left-handed, while the second was right-handed. After the deformity had been once produced, vigorous efforts at clearing the nostril by closing the other passage, would only increase the deformity.

The treatment in each case consisted in dissecting out the cartilage through a small incision made over it, resecting the redundant portion of mucous membrane, and uniting the edges with fine sutures. The result was satisfactory in each case.

#### PERFORATION OF THE SEPTUM.

Perforation of the nasal septum may take place through either the bony or the cartilaginous portions. In the former case, it is probably due, in the very large majority of instances, to an ulcerative and necrotic process, the result of syphilis, scrofula, or one of the graver constitutional dyscrasiæ, although in rare instances I have seen it occur from traumatism, the injury having caused a comminuted fracture of the vomer, with the subsequent sloughing away of the small fragments, by which a permanent opening



between the two cavities was established. Schmiegelow<sup>1</sup> reports a somewhat unique case in which perforation of the bony septum followed an attack of idiopathic periostitis.

Perforation of the cartilaginous portion of the septum, on the other hand, is in most instances due to purely local causes, although this region, of course, is not exempt from the invasion of syphilis and other systemic dyscrasiæ. The most common cause of this form of perforation is to be found in the existence of a projection of the cartilage into one or the other passage, whereby its prominent portion becomes subjected to the current of inspired air, laden as it is with dust and other impurities, whereby a process of erosion is established, under which the cartilage is gradually worn away until an opening occurs. This is a purely local process and involves no suspicion of a systemic taint. The existence of the erosion is attended with an annoying crust formation over its site, causing a frequent picking at the nose, by which the process of erosion is much hastened.

This process, as we see, is really a conservative effort on the part of nature to relieve the patient of an obstructive lesion in the nose, and one, moreover, which I have frequently seen attended with signal success, since the removal of the obstruction seems to be the primary effect of the process, while the establishment of a perforation is to an extent adventitious. I cannot agree with Zuckerkandl<sup>2</sup> in the view that these cartilaginous perforations are due, in the large majority of instances, to an ulcerative or inflammatory action, in that the simple erosion in my experience is never attended with either of these processes. Schmiegelow<sup>3</sup> has seen one case in which the perforation in this region was congenital and which involved a very large portion of the septal cartilage. This would seem, without much question, to be a case of arrested development, although Zuckerkandl<sup>3</sup> does not believe this is the case. Similar cases have been observed by Hildebrandt<sup>4</sup> and Hyrtl.<sup>5</sup>

The frequency of these perforations is well shown by Zuckerkandl,<sup>3</sup> who in one hundred and fifty autopsies found eight cases. As will be inferred from what has been said, I am disposed to think that the clinical significance of openings through the septal cartilage is comparatively trivial. They cause no inconvenience and indicate the existence of nothing other than a simple local process of erosion. Nor do they give rise to any symptoms, except in those

<sup>1</sup> *Hospitalstidende*, 1886, 3 Racke, iv., Bd., no. 42.

<sup>2</sup> "Anatomie der Nasenhöhlen," Wien, 1882, p. 99.

<sup>3</sup> *Loc. cit.*

<sup>4</sup> "Lehrbuch der Anatomie," Wien, 1802, vol. iii., p. 162.

<sup>5</sup> "Handbuch der Topographischen Anatomie," Wien, 1871, I. Bd., p. 316.

rare instances when the opening occurs in a septum which is bent somewhat diagonally across the passage, whereby the respiratory current of air gives rise to a whistling sound, on its entrance and exit; while the erosion exists, hemorrhage is liable to occur, but this is rarely serious in character. The clinical significance of openings through the bony portion have already been sufficiently indicated.

The erosion, however, soon heals up, leaving a smooth rounded border to the opening which is easily recognized on inspection

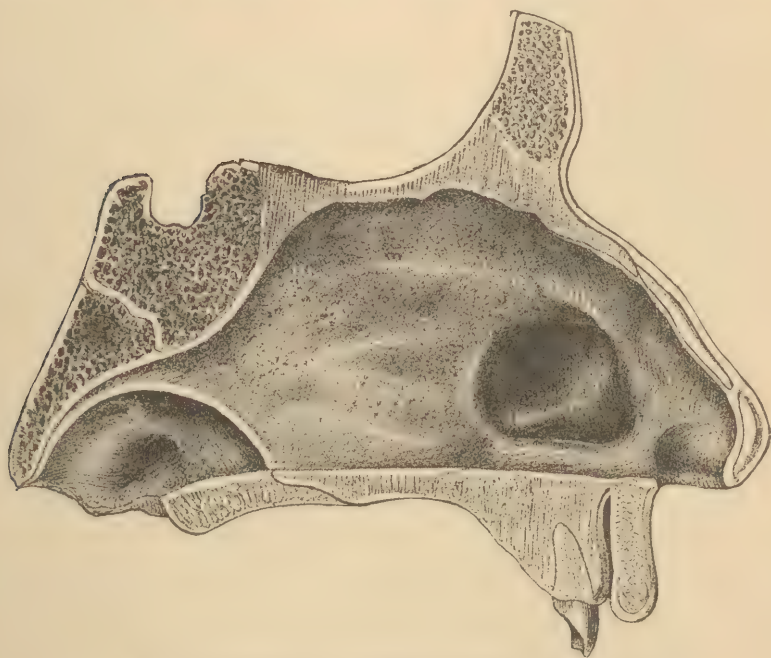


FIG. 100.—Perforation of the Cartilaginous Septum. (Zuckerkindl.)

through the anterior nares. This is well illustrated in Fig. 100. There are no special indications for treatment. If the edge of an opening projects into one or the other passage it is to be removed. If erosion exist, giving rise to epistaxis or annoying crust formation, it is easily controlled by local application of vaseline, cold cream, or any simple emollient, applied two or three times daily. There is a somewhat prevalent idea that these perforations so weaken the supports of the nose as that they may eventually cause an external deformity. This is, I think, an entirely mistaken idea, as I have never seen such an accident occur, except in the case of syphilitic ulceration and necrosis which was active and progressive.

## CHAPTER XIX.

### EPISTAXIS.

THIS term epistaxis, meaning properly a dropping, was used by older writers to define milder attacks of hemorrhage, which were characterized by a mere dropping of blood from the nose. In our day, however, it is used to define all varieties of nasal hemorrhage.

ETIOLOGY.—Bleeding from the nose, while in most cases a comparatively trivial affair, in others may involve grave danger to health, and even to life. As a rule, it is due to some unimportant local lesion, while in other cases, it may arise as the result of some systemic condition. Epistaxis may be the result of (1) *traumatism*; (2) *constitutional or systemic conditions*; (3) *vicarious menstruation* and (4) *local morbid conditions of the nose*.

*Traumatic*.—The most frequent injury which gives rise to an epistaxis, is a direct blow upon the nose, causing a rupture of some of the blood-vessels, more frequently of the septum. Just how this acts, it is not easy to determine. Probably, however, there is a solution of continuity, at some of the sutural junctions. Where the blow is sufficient to cause fracture of the septum, the hemorrhage is apt to be of rather a violent character, while the simpler injuries give rise, as a rule, to but trivial loss of blood. Among the rarer injuries which cause an epistaxis may be mentioned fracture of the base of the skull, involving its anterior fossa. In some cases, the escape of blood may be entirely beneath the mucous membrane, giving rise to a hæmatoma, which may attain sufficient size, as suggested by Schech,<sup>1</sup> to protrude from the nostril. Under the same head should be classed those cases of bleeding which are excited by the introduction of irritating substances into the nose, as is the common habit with young children.

*Diathetic*.—Among the diathetic conditions which may cause bleeding from the nose, may be enumerated: plethora, anæmia both simple and pernicious, the hemorrhagic diathesis, purpura hemorrhagica, organic disease of the heart, and disease of the liver and kidneys. It may also occur in certain acute diseases, such as typhoid

<sup>1</sup> "Diseases of the Mouth, Throat and Nose," Engl. ed., Edinburgh, 1886, p. 256.



and relapsing fevers, and according to later writers, it occurs sometimes in pneumonia.

*Vicarious.*—Under this head we include those curious cases, in which hemorrhage from the nose is substituted for the normal menstrual flow. In the same way, nasal hemorrhage at the menopause may be regarded as to a certain extent vicarious. B. Fränkel<sup>1</sup> has collected a number of cases of vicarious menstruation, which bring out some exceedingly interesting points. Thus, in a case of Kussmaul's,<sup>2</sup> there was periodical nasal hemorrhage in a woman with total absence of the uterus, while in a case reported by Fricker,<sup>3</sup> violent hemorrhage recurred at intervals of six weeks, in a girl of nineteen who had never menstruated, resulting finally in the death of the patient. Still another case was observed by Sommer<sup>4</sup> in which monthly hemorrhage occurred from the nose in a woman, during the whole period of a fifth pregnancy, while Obermeier<sup>5</sup> records the instance of a young woman in whom regular menstruation occurred once at the age of fifteen, after which she had a monthly recurrence of nasal hemorrhage, lasting three or four days, ceasing only when she was pregnant. Fränkel also quotes the observations of Puech,<sup>6</sup> who found in ninety-nine cases of vicarious menstruation, that the seat of hemorrhage was the nasal mucous membrane in eighteen, the lungs in twenty-four, the breast in twenty-five, and the stomach in thirty-two.

Joal<sup>7</sup> lays special stress upon the intimate relation which he believes to exist between the sexual apparatus and the turbinated bodies. He believes that many cases of epistaxis in young persons come from masturbation, congestion of the turbinated bodies at the time of the catamenial flow, or some other form of irritation affecting the sexual apparatus.

*Local Lesions.*—Slight deformities of the septum are probably the cause and source of an epistaxis more frequently than any other lesion met with in the nasal cavity, the apex of the projecting portion becoming the seat of a slight erosion, probably as the result of attrition by the dust-laden current of the inspired air. In this manner, the walls of the blood-vessels become thin, while at the same time the eroded surface forms a site for the formation of dry crusts. When these crusts are picked away by the finger, as is the habit, hemorrhage is very liable to ensue. Again, on the concavity of a deflected septum, there is this same tendency to

<sup>1</sup> Ziemssen's "Cyclopædia," vol. iv., p. 152.

<sup>2</sup> "Vom Mangel der Gebärmutter," Würzburg, 1859.

<sup>3</sup> Württemberg Med. Correspond., 1844, No. 21.

<sup>4</sup> Heidelberger Ann., x., 3.

<sup>5</sup> Virchow's Arch., vol. liv., p. 435.

<sup>6</sup> Gaz. des Hôpitaux, 1863, p. 188.

<sup>7</sup> Rev. mens. de laryngol., 1888, Nos. 2 and 3.

crust-formation, producing an eroded surface, which bleeds upon the removal of the crusts. It is often stated<sup>1</sup> that epistaxis is met with as the result of erosions, which occur in connection with the incrustations on the septum in atrophic rhinitis. Neither ulceration nor erosion ever occur, I think, in atrophic rhinitis, and furthermore, the incrustations, as a rule, do not form upon the septum. Epistaxis I regard as one of the rarest of symptoms in this disease. The same, I think, may be said in regard to the ulcerations which occur in connection with syphilis and tuberculosis, the ulcerative processes in these affections rarely invading the blood-vessels. Neoplasms, with the exception of mucous polypi, may become the source of violent attacks of epistaxis. This is especially true of fibroid tumors and the angio-sarcomata, and also of the fibro- and myxo-sarcomata, though probably in a much less degree. In carcinoma of the nose, also, hemorrhage is a frequent symptom. Foreign bodies in the nasal passages may give rise to occasional mild attacks of epistaxis, although this is somewhat rare.

**PATHIOLOGY.**—The hemorrhage in these cases, in the large majority of instances, is undoubtedly from blood-vessels, ruptured either by traumatism, an erosion, or by an ulcerative process. Occasionally, as in the case of an angio-sarcoma, the hemorrhage may occur directly from the tumor itself. In fibroma and carcinoma, however, the source of the blood is in erosions, caused by the pressure of the growth, although in the late stages of carcinoma, blood-vessels may be opened, as the result of ulcerative action. The source of the hemorrhage, in the very large proportion of cases, is in the septum. Thus, Chiari<sup>2</sup> states that in twenty-two cases out of twenty-five, the bleeding point was found on the septum, while Baumgarten<sup>3</sup> found the more frequent site to be the septum, next the floor of the nose, and least frequently, the turbinated bodies. A similar view is expressed by Robinson.<sup>4</sup> Mackenzie,<sup>5</sup> on the other hand, states that the site of the hemorrhage, is most frequently on the outer wall of the nose, while Moure<sup>6</sup> more guardedly asserts that the hemorrhage may occur from the turbinated bodies. The soft spongy membrane covering the turbinated bodies does not present the conditions favoring the development of an erosion, such as we find in the thin mucous membrane stretched, as it were, over the bony or cartilaginous structures of the septum. Hence, I think we must regard Mackenzie's state-

<sup>1</sup> B. Robinson: N. Y. Med. Journal, September 24th, 1887.

<sup>2</sup> Wiener Medicin. Zeitung.

<sup>3</sup> "Treatment of Epistaxis," Vienna, 1886.

<sup>4</sup> Loc. cit.

<sup>5</sup> "Diseases of the Throat and Nose," Amer. ed., Phila., 1884, vol. ii., p. 346.

<sup>6</sup> "Manuel Pratique des Maladies des Fosses nasales," etc., p. 227.

ment as open to question. The same, I think, may be said of Sajous's<sup>1</sup> assertion that hemorrhage may occur from the glands in the vault of the pharynx.

**SYMPTOMATOLOGY.**—The bleeding may be somewhat trivial in character, dripping slowly from the nose, or so profuse in amount as to run in a continuous stream. As the blood pours out, clotting necessarily occurs in the side from which it starts, and may gradually occlude this passage, as the result of which it becomes filled with blood, which pouring over the septum, escapes from the opposite side. The character of the blood is usually of a dark color, though occasionally we may have the rupture of a minute artery on the septum, giving rise to arterial hemorrhage. Profuse arterial hemorrhage from the nose, however, rarely occurs, except as the result of ulceration from a malignant growth. If the bleeding occurs in connection with the hemorrhagic diathesis, this is usually elicited by a history of former hemorrhages, and also may be fairly determined by the failure of the blood to form clots. The bleeding generally occurs from one nostril. Habitual bleeding from the same side would rather indicate a local lesion of that cavity, while hemorrhage from both sides would point probably to some systemic condition. Certain prodromic symptoms are occasionally met with, characterized by a feeling of fulness in the head, vertigo, throbbing of the temples, headache, disturbance of vision, etc. These symptoms usually occur in individuals of plethoric habit, in whom an epistaxis is to be regarded as a conservative effort of nature, although certain febrile affections may be preceded by an attack of bleeding from the nose. Dangerous epistaxis may occur as the result of traumatism, or from the presence of tumors, and also in the hemorrhagic diathesis, disease of the kidneys and heart, vicarious menstruation, and the continued fevers. Semon,<sup>2</sup> observing an epidemic of relapsing fever, met with epistaxis as a critical symptom in thirty per cent of the cases, and in one extremely exhausted case, it was the actual cause of death.

The general symptoms, which result from epistaxis, depend entirely on the amount of blood lost. Thus, if this is excessive, faintness or complete syncope may ensue. This symptom is usually attended by a diminution or complete arrest of the bleeding, although it should always be borne in mind, that, when syncope occurs, the blood may continue to flow into the air passages below, involving the danger of a new complication.

**DIAGNOSIS.**—The prominent point of interest involved in the question of diagnosis is in those cases in which slight hemorrhage

<sup>1</sup> "Diseases of the Nose and Throat," Phila., 1886. p. 207.

<sup>2</sup> "Zur Recurrens-Epidemie in Berlin," 1871-72. Inaug. Dissert., 1873.



has occurred, in the night perhaps, and the blood, passing into the fauces, is hawked or coughed up, giving rise to apprehension, on the part of the patient, of pulmonary disease. An anterior or posterior rhinoscopic view, as a rule, will serve to establish this source of the hemorrhage, by the shreds of clotted blood still to be observed, either in the nasal cavity, or the vault of the pharynx. Furthermore, the venous character of the expectorated blood would indicate the nose or throat as its source.

TREATMENT.—Where the attack is of a mild character, it will ordinarily be sufficient to make an application of ice to the side of the nose from which the bleeding occurs, while at the same time a small piece may be held in the mouth, the object being to produce direct contraction of the blood-vessels. Indirectly, this may be accomplished also by cold applied to the spine, as in the well-known domestic remedy of applying a cold key to the back of the neck; the vascular contraction, in this case, being due to a reflex action. This is undoubtedly best accomplished by cold applications, although Chapman's bags filled with water at the temperature of one hundred and five degrees have been used for the same purpose. The position of the patient is of importance, I think, the best being that suggested by Moldenhauer<sup>1</sup> who advises that the patient should be placed on his side, with the head turned forward, to allow the blood to escape from the nostril. This position is certainly preferable to the sitting posture recommended by Moure.<sup>2</sup> Placing the patient absolutely on the back, as advised by Sajous,<sup>3</sup> would seem to be objectionable, as permitting the blood to flow into the throat. In every case where feasible, an attempt should be made to locate the bleeding point, and in many cases this will be successful, as in the majority of instances the source of the hemorrhage is near the nostril, and can be easily brought under inspection, when a pledget of cotton can be inserted, and pressure made by the finger on the outside of the nose. Mackenzie<sup>4</sup> advises pressure on the outer wall of the nose by means of the finger inserted into the nostril, after the manner of Valsalva. As before stated, however, I think the rule is that the bleeding surface is some point on the septum. The same writer advises that pressure be made on the facial artery, as it passes over the ramus of the inferior maxillary bone. Pressure on the septum by the finger inserted into the nostril may be efficacious in directly controlling the hemorrhage by pressure on the bleeding surface, or as

<sup>1</sup> "Die Krankheiten der Nasenhöhlen," Leipzig, 1886, p. 132.

<sup>2</sup> Op. cit., p. 230.

<sup>3</sup> "Diseases of the Throat and Nose," Phila., 1886, p. 208.

<sup>4</sup> Op. cit., p. 346.

Cohen<sup>1</sup> suggests, by occluding the septal artery. Keetley<sup>2</sup> finds the external application of hot water, of a temperature of one hundred and twenty to one hundred and twenty-four degrees, an efficacious measure. Contraction of blood-vessels in one of the cavities, by the external application of heat and cold, is I think, undoubtedly a reflex phenomenon, and therefore is induced by the direct external stimulus or shock. Hence, I think, we should regard the cold application as a more powerful agent, and our efforts should be exerted with the idea of making an impression of a very decided character. Mackenzie<sup>3</sup> quotes a case in which an epistaxis was arrested by plunging the body into a cold bath. Certain revulsive agents, for determining the blood to the extremities, are recommended by all writers, such as a mustard plaster to the calves of the legs, immersing the feet in hot water, etc. Virtually the same effect is accomplished by a firm ligature applied around all the extremities, as suggested by Patrick.<sup>4</sup> A curious case has been reported by Verneuil in which an epistaxis was arrested by a blister over the hepatic region, in a case of cirrhosis of the liver. A similar case is also quoted by Eccheverria,<sup>5</sup> in which no hepatic disease is mentioned.

Simpler measures failing to arrest the hemorrhage, resource should be had to local applications to the nasal cavity. The simplest of these is the injection of cold water by means of a syringe, or the insertion of a pellet of ice into the cavity, or, as accomplishing the same purpose, hot water may be used. Dr. Stewart,<sup>6</sup> of Minneapolis, reports a case in which an epistaxis was arrested by passing hot water through the nasal fossæ, by means of the Thudichum douche, the operation being continued until the water flowed from the opposite nostril unstained by blood, thus arresting the hemorrhage, and at the same time leaving the nasal passages unobstructed by clotted blood.

Astringent applications naturally suggest themselves to any one endeavoring to arrest an epistaxis, and for this purpose, tannin or alum, in powder and solution, the various iron preparations, and perhaps other drugs of the same class may be used. These may be applied by means of the syringe or spray, or carried into the cavity on a pledget of cotton. I have always been averse to using these so-called hæmostatics in the nasal cavity, both on account of

<sup>1</sup> "Diseases of the Throat and Nasal Passages," 2d ed., Phila., 1879, p. 378.

<sup>2</sup> *The Practitioner*, February, 1879, cited by Mackenzie, op. cit., vol. ii., p. 346.

<sup>3</sup> Op. cit., p. 346.

<sup>4</sup> *New York Med. Journal*, March 19th, 1887.

<sup>5</sup> *El Dictaman*, June 30th, 1887.

<sup>6</sup> *New York Med. Record*, September 8th, 1883, vol. xxiv., p. 262.

the unsatisfactory results obtained, and also from the fact, that their local action on the healthy membrane forms an exceedingly disagreeable feature of the treatment. Moreover, the resulting mass of clotted blood, combined with the medicament used, obscures the inspection of the parts, and at the same time hampers further measures of treatment. These agents are best used by immersing a pledget of cotton in the fluid, or sprinkling the powders on its surface, and carrying it well into the cavity. I question if what good results are obtained, be not from the plug, rather than from the drug with which it is medicated. The combination of iron with blood forms an exceedingly disagreeable mass, and one also through which blood will flow, hence I think it is rarely necessary to make use of this agent. The same objection, though in a lesser degree, lies against tannin. Alum, however, is not especially objectionable, and in many cases will be of service. It is best used in the strength of twenty grains to the ounce of water, either in the form of a spray, or with a syringe, or it may be applied with cotton pledgets. Lavrand<sup>1</sup> has found antipyrin an efficacious remedy; a watery solution, of a strength one part to thirty, being carried in on pledgets of cotton. This is a remedy of undoubted value, but is better, I think, applied in the form of a powder, either insufflated, or blown in with a tube. Of all local remedies, however, we have none whose action is so striking and so unvarying as that of cocaine, provided that we can apply it directly to the membrane, and secure its absorption to a sufficient extent to produce its characteristic action on the muscular coat of the blood-vessels, by which their calibre is so markedly diminished. I believe cocaine to be the only drug in our pharmacopœia which possesses an absolutely certain constricting action on the blood-vessels. This action, furthermore, is best obtained by the weaker solutions, a four-per-cent strength being preferable. It may be applied with pledgets of cotton, carried well into the cavity, one after the other, or better still, I think, in an oily emulsion as follows:

- R Cocain. hydrochlorat., . . . . grs. xx.  
 Aquæ, . . . . . 3 ss.  
 M. ft. sol. et adde  
 Ol. voschano (see p. 115)  
 Vel Ol. petrolati (zero) vel ol. olivi, . . . ad ʒi.  
 M.

This combination is easily atomized by the hand-ball atomizer (shown in Fig. 47) and may be sprayed into the cavities. In this manner, we secure a more permanent action of the cocaine, in that

<sup>1</sup> Journal de Médecine et de Chirurgie Pratique, Nov., 1885.



it is not washed out by the flowing blood as rapidly as a watery solution, and furthermore, the oily fluid seems to exercise a certain mechanical action in arresting the hemorrhage.

If the foregoing measures fail to arrest or markedly modify the severity of the hemorrhage, plugging should be resorted to, before constitutional symptoms of excessive loss of blood supervene. A number of mechanical devices have been suggested for plugging the nose, in the form of air or water-bags. The earliest of these was the suggestion of J. P. Frank,<sup>1</sup> who used a portion of the intestine of a hog, which, after insertion into the nasal cavity, was distended with water. Similar devices were suggested by St. Ange<sup>2</sup> and Cooper Rose,<sup>3</sup> air being used for the inflation of the bags; while Antoni<sup>4</sup> has modified the instrument, by inserting within the outer bag a rubber tube, open at both ends, through which the patient may be allowed to breathe, after the outer bag has been inflated in the nose. This modification would seem scarcely necessary or practicable, as the breathing tube would undoubtedly be collapsed by the pressure in the outer tube necessary to fill the cavity. The ordinary rubber toy-balloon, sold on the streets, would probably answer quite as good a purpose in an emergency as any of the devices above mentioned, but I am disposed to think this measure somewhat impracticable, and furthermore, the apparatus is rarely at hand. A much simpler and more efficacious method is plugging with pledgets of cotton, or the single large tampon. The tampon possesses the advantage of being easily removed after it has served its purpose, and yet I think is less efficient than pledgets of cotton, packed one after the other through the nostril, as large a plug as can be well inserted being placed behind, well into the posterior nares, followed by smaller pledgets, packed directly against it, and above it, until the whole cavity is filled. The difficult part of this procedure is the insertion of the first plug, which should be an inch to an inch and a half long, of the size of the forefinger. This should be grasped in its whole length by a pair of slender forceps and carried through the middle meatus and well backward until near the posterior nares, when it should be packed down firmly on the floor of the nares, with the closed blades of the forceps. The only difficulty about this procedure is in the subsequent removal of the plugs. To overcome this, it may be well to tie a string to the first plug only, although Schech<sup>5</sup> advises

<sup>1</sup> "De Curandis hominum morbis," Mannhemii, 1807, lib. v., pars ii., p. 144.

<sup>2</sup> Lapeyroux, Thèse de Paris, 1836, No. 314.

<sup>3</sup> Mackenzie, op. cit., vol. ii., p. 281.

<sup>4</sup> Bolletino delle Malattie dell' orecchio, della gola, etc., No. 3, 1886.

<sup>5</sup> "Diseases of the Mouth, Throat, and Nose," English ed., Edinburgh, 1886, p. 258.

that a separate string be tied to each plug. A better device still, perhaps, is that of Moure,<sup>1</sup> of a kite-tailed tampon, made up of pledgets of cotton, inserted at varying distances, in the continuity of a single cord. An excellent suggestion is made by Ingalls,<sup>2</sup> who advises the use of a strip of iodoform gauze as a tampon, for the decomposition which takes place in these plugs, after remaining *in situ* for one or two days, may give rise to unpleasant symptoms. The continuous tampon possesses an undoubted advantage, in that many cases are met with in which hemorrhage is not arrested by this measure, hence the rapid removal of the plugs is of importance, in order to proceed to our last resort in controlling the epistaxis, viz.: by plugging the posterior nares. The first step of this manipulation requires the passing of a cord through the nares, and out through the mouth. In former times this was done by the aid of Bellocq's canula. This instrument is an awkward, cumbersome device, and usually constructed with a curve entirely inappropriate for insertion into the nasal cavity. By far the best instrument for carrying a cord through the nose is a soft-rubber or English catheter, of small size, which will readily pass through the lower meatus to the pharynx, where it can be seized with the forceps, or thrown forward into the mouth by a hawking effort on the part of the patient. If necessary, the stylet may be inserted into the catheter for the purpose of introducing it, although, as a rule, this is not necessary. After the catheter is in position, a stout cord should be fastened to either end, and drawn through the cavity. A pledget of cotton sufficiently large to completely fill the posterior nares, perhaps the size of the last phalanx of the thumb, should be tied firmly into the continuity of the cord, and drawn up behind the palate, and firmly fixed in the posterior nares. As a rule, it will be well to facilitate the passage of the plug to its position, by the left forefinger inserted behind the palate, to prevent the plug from becoming engaged against the velum. The remaining step consists in plugging the anterior nares firmly. The two ends of the cord are now fastened together, and may be carried, for convenience, over the ear. The object of leaving the cord in the mouth, of course, is to enable the operator to remove the plug when necessary. I have seen several cases where this cord was cut close to the tampon; as a consequence the removal of the plug became a somewhat difficult matter, and in one case it became necessary to leave it *in situ* for three weeks, until it became loosened and dropped into the pharynx spontaneously. Robinson,<sup>3</sup> in a similar dilemma, passed a flexible catheter into the pharynx through the nares, and,

<sup>1</sup> Op. cit., p. 233.<sup>2</sup> Medical News, July 23d, 1887.<sup>3</sup> New York Pathological Society, April 27th, 1881. Medical Record, July 16th, 1881.

attaching to it the nasal extremity of the cord, drew it down into the pharynx, and extricated the plug. Moure<sup>1</sup> suggests that where the nasal cavities are obstructed by tumors, deformities of the septum, or other causes, the posterior nares may be plugged by carrying a pledget of cotton behind the palate, with a pair of properly curved forceps. This procedure is a difficult one, and will be materially aided by digital manipulation.

The plugs should be allowed to remain in position not longer than forty-eight hours, when they may be with safety removed. I have never seen any accident follow plugging of the posterior nares, although Mackenzie<sup>2</sup> cites a number of instances, in which the procedure caused extensive gangrene of the face, tetanus, pyæmia, facial erysipelas, and in some cases resulted in death; while Gellé<sup>3</sup> reports a case of double purulent otitis media resulting from this procedure.

Too much emphasis cannot be laid on the importance of searching for the bleeding point in every case of epistaxis, before any measures are employed for arresting the hemorrhage. If this is done by means of a head-mirror and a good light, the nostril being well dilated, probably in the large proportion of cases the bleeding surface can be thus brought into view, by cleansing the membrane from the flowing blood by means of a pledget of cotton, when measures for the arrest of the hemorrhage become comparatively simple. When the bleeding point has been located, the hemorrhage may be arrested, as a rule, by simple pressure, although in certain cases a local application is preferable, in avoiding the discomfort attendant upon the insertion of plugs. Chiari<sup>4</sup> expresses preference for the galvano-cautery in these cases, while Robinson<sup>5</sup> condemns it, justly I think, for certainly a simple stick of nitrate of silver, or crystal of chromic acid, will often answer the purpose equally well, and is much more easy of manipulation, or if these fail, the ordinary silver probe, heated with a spirit lamp to a dull heat, offers most of the advantages of the galvano-cautery and, moreover, is always available.

In addition to local measures, there are certain internal remedies which are regarded as possessing the property of controlling hemorrhage. These remedies act either directly upon the blood or on the blood-vessels, diminishing in one case the fluidity of the blood, and in the other, acting on the muscular coats of the blood-vessels, in such a way as to contract their calibre. Tan

<sup>1</sup> Op. cit., p. 234.

<sup>2</sup> Op. cit., p. 348.

<sup>3</sup> Société Française de Laryngologie, October, 1886.

<sup>4</sup> Wien. Med. Zeitung; Medical Record, August, 1883.

<sup>5</sup> New York Med. Journal, Sept. 24th, 1887.



nic and gallic acid, acetate of lead, and sulphuric acid, and the various preparations of iron, are supposed to diminish the hemorrhagic tendency; while ergot, belladonna, digitalis, hamamelis, and antipyrin act to diminish the calibre of the blood-vessels. I see no objection to the administration of any of these remedies in severe cases of hemorrhage, as aids to the local measures resorted to, although I think little reliance can be placed upon them. Certainly my own experience has failed to demonstrate their usefulness. The use of ergot has been somewhat warmly advocated by Mackenzie<sup>1</sup> and probably few of us, in severe cases of hemorrhage, would consider our whole duty fulfilled without the hypodermatic administration of twenty minims of the fluid extract of this drug, repeated according to circumstances. Opium, also, in some of its forms, may well be given, both on account of its supposed action in contracting the blood-vessels, and also on account of its anodyne effect, wherein I think lies its chief value. I should fully agree with Mackenzie<sup>2</sup> in regard to the tincture of opium, as the best form for its administration. Fränkel<sup>3</sup> cites instances in which periodic attacks of epistaxis, which he regards as having been due to malarial origin, were cured by the administration of quinine. Harvey<sup>4</sup> also reports a somewhat similar case, in which the epistaxis recurred daily at 3 P.M. for seven days, when it was finally arrested by the administration of anti-periodic remedies. In this case, there was no evidence pointing to malarial poisoning other than the periodicity. Where the loss of blood is very great, transfusion or infusion naturally suggests itself, as a means of restoring the vitality of the patient, rather than for the arrest of the hemorrhage, and yet Mackenzie<sup>5</sup> cites a case reported by Mosler, in which the hemorrhage was arrested by the transfusion of blood. The infusion of a saline solution or of warm milk would probably answer the same purpose.

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<sup>1</sup> Op. cit., p. 248.

<sup>2</sup> Op. cit.

<sup>3</sup> Ziemssen's "Encyclop.," Amer. ed., vol. iv., p. 152.

<sup>4</sup> New York Med. Record, May 20th, 1882, vol. xxi., p. 541.

<sup>5</sup> Op. cit., p. 349.

## CHAPTER XX.

### FOREIGN BODIES IN THE NASAL PASSAGES.

EITHER by accident or the curious instincts of childhood, a foreign body in the nose is a not infrequent condition, demanding surgical interference. In the large majority of instances these bodies are inserted through the nostril intentionally, by mischievous children or hysterical females, while others make their way into the cavities through the posterior nares, in an oftentimes obscure and rather a curious manner. Thus, in the act of vomiting, a portion of the contents of the stomach is frequently thrown into the nasal fossæ, and some parts of it may remain. Thus, not long since, I removed a deciduous tooth from the nasal cavity, in a gentleman aged thirty-seven, which had been the cause of a purulent catarrh for twenty-five years. In this case, the tooth, becoming loosened in its socket, had been swallowed at the age of twelve, and probably afterward thrown into the nasal cavity, in the act of vomiting. A somewhat curious case is reported by Lowndes,<sup>1</sup> in which a ring was found impacted in the posterior nares of a child fifteen months old, which was too large to have made its way through the nostril, and which probably had been swallowed and subsequently thrown into this locality by vomiting. Of course, soft particles of food, ejected from the stomach into the nasal cavities, are easily expelled, and prove but ephemeral sources of irritation. Moldenhauer<sup>2</sup> mentions the liability of lumbricoid worms, pills, fruit stones, etc., to reach the nose in the act of vomiting, and furthermore, that this accident is facilitated by paralysis of the palate. Mention has already been made, in the chapter on epistaxis, of tampons being left in the nasal cavity by plugging. As a rule, these loosen themselves, and come away spontaneously, although, in one case, I removed a tampon which had been inserted for the purpose of controlling an epistaxis, and which had been the source of an exceedingly offensive purulent discharge from one of the nasal cavities for two years. Similar accidents are alluded to by Moldenhauer<sup>3</sup> and

<sup>1</sup> British Med. Journal, September, 1867, p. 206.

<sup>2</sup> "Die Krankheiten der Nasenhöhlen," Leipzig, 1886, p. 122.

<sup>3</sup> Loc. cit.

Moure.<sup>1</sup> The objects which are inserted into the nose anteriorly, are shoe-buttons, beans, pebbles, and, in fact, any object whose size the nostril admits. When inserted in this way, they usually lodge just within the nostril, against the anterior extremity of the lower turbinated bone, although occasionally they lodge midway in the lower meatus. Entering from behind, they lodge as a rule well back in the lower meatus, although Moure<sup>2</sup> states that, when entering in this direction, they lodge in the middle meatus, an assertion which does not coincide with my own observation. Among rarer accidents are those in which a foreign body makes its way into the nasal cavity through the external walls of the nose, as in the case quoted by Moldenhauer<sup>3</sup> in which a splinter of wood made its way through the canine fossa, and was removed from the inferior meatus a month later. In the same way a spent bullet, fragments of iron or other objects may make their way into the nasal cavity by penetrating the bones of the face. Interesting cases have recently been reported by Noquet,<sup>4</sup> Coupard,<sup>5</sup> and Lastra.<sup>6</sup>

SYMPTOMATOLOGY.—The immediate effect of the presence of any foreign body in the nose, is to excite more or less profuse sero-mucous discharge, which is soon converted into a muco-purulent or bloody discharge, as the result of the ulcerative process which its presence causes in the mucous membrane, against which it is lodged. Hence, the prominent and characteristic symptom to which it gives rise, is an offensive muco-purulent discharge. The presence of the object itself, causes more or less stenosis of the passage, which is greatly increased by the swollen condition of the mucous membrane which it causes, and still more by the muco-purulent secretions accumulating in the cavity. Moure<sup>7</sup> makes the point that sneezing, with a sense of oppression and interference with olfaction, is a characteristic symptom, where the body is lodged anteriorly. This I do not think is the case, for the olfactory region, the most sensitive area of the nose, is not encroached upon by the foreign body as a rule. In fact, wherever the foreign body lodges, the membrane becomes to a certain extent tolerant of it, in that reflex symptoms, such as sneezing and watery discharges, are not excited by its presence. Olfaction, furthermore, is not liable to be affected, in that the entrance of odorous particles is not necessarily interfered with, and even if they were, their appreciation by the healthy membrane of the opposite passage would render the dis-

<sup>1</sup> "Manuel Pratique des Maladies des Fosses nasales," etc., Paris, 1886.

<sup>2</sup> Op. cit., p. 147.

<sup>3</sup> Op. cit., p. 123.

<sup>4</sup> Bull. Méd. du Nord, Sept., 1887.

<sup>5</sup> Soc. Méd. Pratique, Mch. 15th, 1888.

<sup>6</sup> Rev. de Méd. de Seville, 1887, Tome xi., No. 6.

<sup>7</sup> Op. cit., p. 149.



covery of any impairment of olfaction in the occluded side somewhat improbable. The morbid process set up in the membrane, furthermore, is not that which leads to the development of ear symptoms, hence, impairment of hearing is probably rarely, if ever, an accompaniment. Facial neuralgia is occasionally present, and may prove an exceedingly distressing symptom. Erosion of the nostril and lip, as mentioned by Schech<sup>1</sup> is not infrequently caused by the acrid discharges from the nose. This is especially observable in young children. The same writer includes epiphora, conjunctivitis, and allied affections among the symptoms of foreign bodies in the nose. These I should regard as somewhat rare.

DIAGNOSIS.—The occurrence of a chronic purulent discharge from one nostril should always give rise to the suspicion that it is due to the presence of a foreign body, for in those diseases of the nose which are characterized by a purulent discharge, the rule is almost universal that it is bilateral. Syphilis may cause an offensive discharge from one side, but this disease makes itself known by other and concomitant symptoms, which would render a mistake in diagnosis almost impossible. Disease of the accessory cavities of the nose is almost always unilateral, but in these cases, stenosis is the rare exception, while it is always present to a more or less extent in the case of a foreign body, and moreover, it is a disease of adult life. The presence of myxoma and fibroma does not cause a purulent discharge, while in sarcoma and carcinoma it is the rule. These growths, however, make their presence known by symptoms not to be mistaken. Furthermore, the discharge caused by the presence of a foreign body in the nose is somewhat peculiar, in that mixed with the pus are found small flocculent whitish masses of inspissated mucus, presenting a somewhat cheesy appearance, which is characteristic. The ulceration in the nasal cavity is not progressive, and rarely, I think, extends through the thickness of the mucous membrane. Occasionally the pressure may produce perforation of the cartilaginous septum, but never a true necrosis of bone. If the foreign body is of sufficient size and lodged anteriorly, external deformity will be noticed in the region of the ala. The diagnosis can only be definitely made by the use of a probe. Cocaine should always be applied, after cleansing the cavity as thoroughly as possible by means of a syringe or spray, when thorough probing is easily tolerated. In the case of young children, I think it is always wise to administer a few whiffs of chloroform, sufficient to produce primary anæsthesia, before any attempt is made at exploring the cavity, for thus a quiescent condition of the child is obtained, which will enable the operator to ascertain the

<sup>1</sup> "Diseases of the Mouth, Throat, and Nose," English ed., Edinburgh, 1886, p. 260.

presence and locality of the foreign body by an exceedingly brief exploration with the probe, without injury to the soft parts, which would be almost an impossibility with a struggling child.

TREATMENT.—As before stated, if the patient is a child, a general anæsthetic should always be given, in order to secure its thorough quiescence, as advised by Mackenzie,<sup>1</sup> Schech,<sup>2</sup> and others, although Moldenhauer,<sup>3</sup> on the other hand, strongly objects to this agent, preferring that the child should be held by two assistants. In adults, general anæsthesia will rarely be necessary. If the body is small, and lodged anteriorly, it will usually be easily seized by a pair of mouse-toothed forceps. If not easily grasped by this, it is sometimes feasible to slip the loop of a snare around it, drawing it tightly, and thus firmly engaging the object. If the object prove too large to extricate through the nostril, it is quite feasible to cut it in two by this instrument, or crush it and remove it piece-meal, thus avoiding the necessity of forcing it through into the pharynx, as would otherwise be incurred, or of enlarging the nostril by the Rouge or Dieffenbach operation, although if the object be too hard to crush with the snare, and too large to withdraw through the nostril, one of these procedures may be necessary. If the object be a shoe-button, its removal is rendered quite simple by the insertion of a hook into its eye. If the mouse-toothed forceps is too small to grasp it, a larger forceps may be used. Durham<sup>4</sup> has devised a pair of forceps with an obstetric lock, by which a better grasp of the object may be secured, while Rastelli<sup>5</sup> has devised a fenestrated hook, based on the principle of the obstetric vectis. These devices, I take it, complicate unnecessarily what is usually a simple manipulation. A simpler instrument is the curette devised by Gross. This instrument has also on its outer extremity a small screw, for insertion into the object, an ingenious device, provided the screw can be inserted without forcing the body back into the nasal cavity. In those cases in which the object is lodged in the posterior nares, it may be dislodged with the finger in the pharynx worked in connection with the probe through the nose, or seized by a pair of curved forceps, passed behind the palate, directed either by the finger or by the rhinoscopic mirror. The use of douches to dislodge a foreign body is not only of questionable efficacy, but probably involves a certain amount of risk, in that the ordinary dangers of the douche are increased by the obstruction. Temain<sup>6</sup> avoids the dangers of the

<sup>1</sup> Op. cit., p. 434.

<sup>2</sup> Op. cit., p. 261.

<sup>3</sup> Op. cit., p. 125.

<sup>4</sup> Holmes's "System of Surgery," 1870, vol. iv.

<sup>5</sup> *Raccoglitore medico*, No. 4, 1887.

<sup>6</sup> *Revue mensuelle des maladies de l'enfance*, Paris, Feb., 1887.

douche, by passing a catheter through the nose beyond the foreign body, and projecting a stream of water against it from behind, in this manner endeavoring to force it out. Many writers mention the use of snuffs to excite sneezing, in the hope of thereby dislodging the object, purely on theoretical grounds, I take it, for certainly a more vigorous expulsive effort can be made in blowing the nose than ever occurs in the act of sneezing. In very young children, who cannot blow the nose vigorously, this may be done for them by the use of a Politzer's bag, blowing into one nostril, or by blowing into the child's mouth; although either of these procedures should be carried out very carefully. After all, however, a foreign body will be usually extracted by means of the forceps or snare, and these supplemental methods need rarely be called into use.



## CHAPTER XXI.

### RHINOLITHS.

WHEN a foreign body has become impacted in the nasal cavity, and remains for a lengthened period of time, there are oftentimes deposited upon it the saline constituents of the mucous secretion, giving rise to a nasal calculus, or, as it is more generally termed, a rhinolith. The earliest instance of this we find recorded by Joseph Mathias de Gardi<sup>1</sup> who relates that one of his confrères removed from the nasal passages a calculus as large as a fir-cone. Subsequently Bartolini<sup>2</sup> reports two cases, in one of which a calculus was formed about a cherry-pit as a nucleus, while the other apparently was produced spontaneously. Similar cases have been reported by Clauder,<sup>3</sup> Kern,<sup>4</sup> and Vitus Riedlinus.<sup>5</sup> Still later, a very curious case was reported by Wepfer<sup>6</sup> in which the calculus was completely imbedded, and covered by the mucous membrane. A case has been noted by Ruysch<sup>7</sup> in which a piece of amber formed a nucleus for the calculus, while Plater,<sup>8</sup> in discussing the causes of their formation, takes the ground that they are due to certain changes in the mucous secretion. Additional cases were reported by Horn,<sup>9</sup> Saviales,<sup>10</sup> Graeffe,<sup>11</sup> Thouret,<sup>12</sup> and Brodie.<sup>13</sup> Perhaps the most exhaustive study of these formations was that made by Demarquay<sup>14</sup> who not only made a full study of all the recorded cases, to which I am much indebted for the references given, but also entered into a full discussion of their causation. The frequency with

<sup>1</sup> "Pratica Venise," 1502, post ii., cap. xiv., p. 308.

<sup>2</sup> "Hist. Anat. rara," 1654, Cen. i., Hist. 33, p. 47; et Ibid., Cent. iv., Hist. 85, p.

<sup>3</sup> "Ephem. curios.," 1685, dec. 2, An. 13, obs. 78.

<sup>4</sup> "Ephem. cur. natur.," 1700, dec. 3, An. 5 and 6, obs. 46, p. 100.

<sup>5</sup> "Ephemer.," 1706, dec. 3, an. 9 et 10, observ. 145, p. 268.

<sup>6</sup> "Ephem.," 1727, obs. 192, p. 905.

<sup>7</sup> "Obser. Anat.," Amsterdam, 1733, obs. 44, p. 42.

<sup>8</sup> "De olfactus lesione," 1736, lib. i., cap. 9, p. 264.

<sup>9</sup> Dans Smuker, 1788, obs. 22, p. 289.

<sup>10</sup> Bulletin de la faculté de médecine, 1814, t. iv., p. 44.

<sup>11</sup> Annales d'oculistique, 1828, t. viii., liv. iv. and v., p. 203.

<sup>12</sup> Arch. générale de méd., 1829, t. xix., p. 27.

<sup>13</sup> Annales de thérapeut. méd. et chir., May, 1844, No. ii.

<sup>14</sup> Arch. générale de méd., 1845, vol. viii., p. 174 et seq.

which nasal calculi are reported in our later literature would seem to indicate their somewhat common occurrence. Thus we find observations recorded by Mackenzie,<sup>1</sup> who also quotes reports of cases by Cooke,<sup>2</sup> Kotlin,<sup>3</sup> Rouyer,<sup>4</sup> W. N. Brown,<sup>5</sup> Verneuil,<sup>6</sup> West,<sup>7</sup> Roe,<sup>8</sup> Her- ing,<sup>9</sup> and Nourse.<sup>10</sup> Still later observations were made by Erichsen,<sup>11</sup> Clark,<sup>12</sup> Bettman,<sup>13</sup> Beach,<sup>14</sup> Bovill,<sup>15</sup> Hendley,<sup>16</sup> Bigelow,<sup>17</sup> C. Creswell Baber,<sup>18</sup> Nolte,<sup>19</sup> Moure,<sup>20</sup> Ferré,<sup>21</sup> Schoetz,<sup>22</sup> Seifert,<sup>23</sup> Rindfleisch,<sup>24</sup> Silitch,<sup>25</sup> Morelli,<sup>26</sup> and Clay.<sup>27</sup>

The formation of the nasal calculus is governed by the same laws which direct the formation of calculi in other portions of the body, that is, a foreign body is impacted in the nasal cavity, and serves as a nucleus, about which there are deposited the solid constituents of the fluid in which it is immersed, namely the normal secretion of the nasal mucous membrane. In most of the cases above enumerated, a nucleus was observed and recognized. In other cases, no apparent nucleus was detected, and yet I think there can be no question that the nucleus must have existed, and subsequently disappeared, as in the case of a large rhinolith removed by the author, which, on section, showed a small cavity which apparently had been occupied by a kidney bean, of which scarcely any trace was left. A small mass of hardened mucus, as suggested by

<sup>1</sup> "Diseases of the Throat and Nose," Amer. ed., 1884, vol. ii., p. 438.

<sup>2</sup> Ranking's "Abstract," 1847, vol. vi., p. 132.

<sup>3</sup> Württemberg. Corresp. Blatt, 1854.

<sup>4</sup> Bull. de la soc. Anat. de Paris, 1857, p. 60.

<sup>5</sup> Edinburgh Med. Journal, 1859, vol. v., p. 50.

<sup>6</sup> Gaz. des Hôpitaux, 1859, p. 25.

<sup>7</sup> London Lancet, 1872, vol. i., p. 147.

<sup>8</sup> Arch. of Laryngology, 1880, vol. i., No. 2, p. 149 et seq.

<sup>9</sup> Monatsschrift für Ohrenheilkunde, 1881, No. 5.

<sup>10</sup> British Med. Journal, October, 1883, p. 728.

<sup>11</sup> "Science and Art of Surgery," 7th ed., Phila., 1881, vol. ii., p. 390.

<sup>12</sup> Albany Med. Annals, 1883, vol. iv., p. 34.

<sup>13</sup> Journal Amer. Med. Association, Sept. 6th, 1884.

<sup>14</sup> New York Medical Record, July 11th, 1885, p. 38.

<sup>15</sup> British Med. Journal, October 16th, 1886, p. 718.

<sup>16</sup> British Med. Journal, December 11th, 1886, p. i, 161.

<sup>17</sup> Albany Med. Annals, 1887, p. 178.

<sup>18</sup> London Lancet, April 16th, 1887, p. 772.

<sup>19</sup> Allg. Med. Cent.-Zeit., 1887, p. 1, 180.

<sup>20</sup> Journal de méd. de Bordeaux, 1887.

<sup>21</sup> Ibid.

<sup>22</sup> Deut. Med. Zeit., 1887, p. 21.

<sup>23</sup> Ibid., p. 86 (also Sitzungs-Bericht der Physikalisch-medicin. Gesellschaft zu Wurzburg, 1885, p. 112).

<sup>24</sup> Ibid.

<sup>25</sup> Vratsch, 1887.

<sup>26</sup> Pesther Med. Chir. Presse, 1887.

<sup>27</sup> British Med. Journal, Feb. 12th, 1887, p. 328.

Cohen,<sup>1</sup> or a blood-clot as suggested by Moldenhauer, may be the starting point in one of these formations, of which probably little trace would be left. In Baber's case, a rag was found as the nucleus, while in one of Seifert's cases a metallic button was the nucleus, and in another a piece of bone, while in Bigelow's case a piece of dried mucus was demonstrated to have been the nucleus. As a rule, these formations are met with singly, the only exception to this which is found being a case reported by Axmann<sup>2</sup> in which the patient, suffering from periodic headache, was relieved by the spontaneous expulsion of a number of rhinoliths.

Their shape is somewhat dependent on the character of the nucleus, as modified by the contour of the cavity, but in general they are elongated, and of an irregular ovoid form. In some cases, they constitute a thin shell, deposited upon a foreign body in the nose; while in others, they form a somewhat dense and almost homogenous solid mass, as in the case of Hendley, where the mass measured two inches in length by seven-eighths in breadth, weighing seven hundred and twenty grains, and was of almost the density of ivory. In Rindfleisch's case, the rhinolith consisted of a calcareous lamella deposited upon the convexity of a deflection of the cartilaginous septum, this deflection being due to inflammatory action. The question arises here, whether this may not have been a case of calcareous degeneration of the mucous membrane described by Virchow<sup>3</sup> and Kölliker,<sup>4</sup> a view which would seem to harmonize more closely with clinical observation of these formations. In the same category, probably, should be placed Erichsen's cases, where the calcareous deposit formed a lamella in the mucous membrane of the ala of the nostril. The cause of these formations, then, in all cases, I am disposed to think, is a foreign body in the nose, acting as a nucleus, around which the calcareous material is deposited. Whether any constitutional diathesis acts as a predisposing cause, seems to me somewhat doubtful. Certainly, in the majority of cases, it is difficult to demonstrate this, although Graefe believes that the gouty diathesis acts as a predisposing factor, a view also entertained by Sajous; while Demarquay, in fifteen cases, finds this diathesis presenting in but one case. This writer believes that a narrowing of the inferior meatus is a predisposing cause to the formation of rhinoliths and, furthermore, that an alteration of secretion has some influence. It would seem that there must be some factor of

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<sup>1</sup> "Diseases of the Throat and Nasal Passages," Philadelphia, 1879, p. 390.

<sup>2</sup> "Die Krankheiten der Nasenhöhlen," Leipzig, 1886, p. 123.

<sup>3</sup> Amer. Journal of Med. Sciences, 1829, old series, vol. v., p. 204.

<sup>4</sup> "Cellular Pathologie," iv. Aufl., Berlin, 1871, p. 453 and note 44.

<sup>5</sup> "Gewebelehre, Geruchsorgan."



this kind, as in a case alluded to by the author, in the chapter on foreign bodies, a tooth was retained in the nasal cavity twenty-five years, which, when removed, showed no deposit whatever. Mackenzie<sup>1</sup> regards chronic inflammation of the nasal mucous membrane as predisposing to the formation of rhinoliths. The presence of a rhinolith naturally excites a certain amount of inflammatory reaction, which would render it somewhat difficult to draw a nice distinction between cause and effect in these cases.

An analysis of these formations shows them to contain the ordinary saline constituents of nasal mucus, which according to Robin contains in 1,000 parts:

Chlorides of sodium and potassium, . . .	5.60
Phosphates of lime and magnesia, . . .	3.50
Sulphate and carbonate of soda, . . .	.90

Schech<sup>2</sup> states that they consist of phosphates and carbonate of lime, and a small quantity of iron, together making up eighty per cent, and that they contain twenty per cent of organic material. In Nolte's case iron was also found.

SYMPTOMATOLOGY.—A consideration of the symptoms due to the presence of rhinoliths involves mainly questions already discussed in the chapter on foreign bodies, with the additional factor, that a rhinolith growing within the nasal cavity attains a large development, which consequently involves certain additional symptoms, due to the mere presence of the growth. In Hendley's case, the nose was greatly swollen, while a sinus opened externally, discharging pus; while in Bovill's case, the left side of the face was swollen, there was left facial paralysis, ptosis and epiphora of the left eye, the nose and the septum were deviated to the right side, and the hard palate was distorted. In Nolte's case, the hard palate was perforated at its junction with the soft palate. In Baber's case the lower turbinated bone was atrophied, and the nose and cheek deformed. We find then these additional symptoms, due to the progressive development of the growth, much in the same manner as a fibroma develops, crowding the soft parts and even bone before it, while at the same time extensive ulceration occurs, giving rise to a profuse purulent discharge, oftentimes of a exceedingly offensive character, which makes its exit through the nostril, into the fauces, or through an artificial opening in the external face, or in the palate. The neuralgia and paralysis which accompany the development of a rhinolith are, of course, dependent on pressure either on the nerve trunk or peripheral filaments. In Axmann's

<sup>1</sup> Op. cit., p. 436.

<sup>2</sup> "Diseases of the Mouth, Throat, and Nose," English ed., Edinburgh, 1886, p. 258.

case, the neuralgia assumed a periodic form. In Bettman's and Clark's cases, mucous polypi developed, in much the same manner, probably, as they occasionally develop around the ragged edges of a syphilitic ulcer.

DIAGNOSIS.—The development of these formations is somewhat slow, and hence they are usually met with in adult life, although in Clark's case the patient was but six years of age, while Baber's was twelve; for while it is in young children that foreign bodies are most frequently met with in the nose, the conditions favorable to the development of a calcareous deposit do not seem to obtain, in most instances, until later in life. The diagnosis is usually easy and depends mainly on investigation by means of the probe, cocaine being applied as thoroughly as feasible. The impact of the probe will reveal the location, and to an extent the size of the rhinolith, while the characteristic grating sensation will determine its character. The only source of error would be in the presence of necrosis of bone, or calcareous degeneration of the mucous membrane. These conditions, however, should be easily recognized, since their location is on the walls of the nasal cavity.

TREATMENT.—The treatment of a rhinolith is essentially the treatment of any foreign body. As a rule, these formations are entirely too large to extract through the nostril, and hence crushing becomes necessary. In many instances, this is easily done by an ordinary duck-bill forceps, or the snare *écraseur* may be used, as suggested in connection with foreign bodies. This is applicable to soft formations, and those in which the nucleus is large, and the outer incrustation is thin. Where the formation is dense and solid, more powerful mechanism will be required for crushing them. For this purpose, any of the ordinary lithotrites designed for crushing urinary calculi are applicable. The crushing of a hard nasal calculus is by no means a trivial operation, and in most cases will require a general anæsthetic. Its dangers are not necessarily great, and yet Mackenzie<sup>\*</sup> states that extensive hemorrhage attended his operation, together with the development of facial cellulitis on the following day. In Hendley's case, the rhinolith was removed by dividing the external nose, while in Nolte's case it was extracted by enlarging the opening in the palate.

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<sup>\*</sup> Op. cit., p. 438.

## CHAPTER XXII.

### PARASITES IN THE NASAL CAVITIES.

ALTHOUGH the various forms of living creatures which either make their way into the nasal cavity, or are developed from ova deposited there, are not, in the strict sense of the term, parasites, yet this is the term used by most writers, in describing this curious condition which, while one of the rarest events in temperate regions, is of somewhat frequent occurrence in tropical climates, involving in many cases extensive local destruction of tissue, with impaired general health, and even death.

While we find reports of isolated cases of this affection scattered through the literature of the last two centuries, no general resumé of the subject was made until Mackenzie's<sup>1</sup> work appeared, in which the literature of this affection has been most thoroughly and exhaustively collated, whence our knowledge on this branch of the subject is mainly derived. The earliest cases reported are those of Gahrlieb,<sup>2</sup> Behrends<sup>3</sup> and Wohlfahrt,<sup>4</sup> in which patients suffering from apparently a severe cold in the head, with violent headache, were treated by hot inhalations of various kinds, resulting in the expulsion of large numbers of maggots from the nose, which were found to be the larvæ of flies, the patients recovering. A much more serious case was reported by Cloquet,<sup>5</sup> in which a man, after sleeping in an open field, was brought into the hospital suffering from violent frontal pains, with a swollen condition, involving the whole face and head, with worms crawling out of the nostrils and ears. The swellings were opened, and in the course of the treatment three plates full of these creatures were removed. The patient recovered with the loss of both his eyes. McGregor's<sup>6</sup> case is interesting, as being the earliest observation of a case occurring in British India, while a more thorough

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<sup>1</sup> "Diseases of the Throat and Nose," vol. ii., pp. 439 et seq.

<sup>2</sup> "Ephem. Nat. Curios.." dec. 3, ann. vii. and viii., observ. 141, p. 260.

<sup>3</sup> Scharschmid's Med. et Chir. Nachrichten, Berlin, 1743, Jahrg. 1, p. 214.

<sup>4</sup> "Obser. de Vermibus per Nares Excretis," Halæ Magdeburgiæ, 1768.

<sup>5</sup> American Journal of Medical Sciences, May, 1828, p. 228.

<sup>6</sup> London Med. and Physical Journal, 1830, vol. 44, p. 498 et seq.



study of the affection in India was made by Lahory<sup>1</sup> who collated ninety-one cases, of which two were fatal. Coquerel,<sup>2</sup> of Cayenne, reports five cases occurring in French Guiana, of which three died, the prominent symptoms in all being similar to those in Cloquet's case; the fatal cases, however, developing meningitis. The disease in Mexico, as studied by Morel<sup>3</sup> and Weber,<sup>4</sup> presents no features worthy of special note. Further observations were made by Frantzius<sup>5</sup> in Costa Rica, Petrequin<sup>6</sup> in Italy, Mankenwitez<sup>7</sup> in Germany, Urbanek<sup>8</sup> and Moquin-Tandon<sup>9</sup> in France, and Prince<sup>10</sup> and Schmitt<sup>11</sup> in the United States. The above-cited authors all quote cases in which the larvæ of different varieties of dipterous insects had developed in the nasal fossæ, from ova deposited by the parent fly after making its way into the cavities.

Fränkel<sup>12</sup> states that patients suffering from ozæna are more liable to this invasion in temperate climates, while in tropical regions it occurs not infrequently in patients in whom the nasal membrane is quite healthy. This is easily explained, since the odor in ozæna is undoubtedly due to decaying animal matter, and, therefore, naturally proves attractive to different varieties of insects. Moreover, the cavities in this disease are large and cavernous, and usually lined with dry crusts, hence the entrance of the insect is very little obstructed. In ordinary hypertrophic catarrh, the passages are narrowed, and the membrane coated with moisture, hence this condition would naturally serve as a protection from the invasion of insects. The diptera, which deposit their ova in the nasal cavity in temperate regions, are the *musca vomitoria*, *musca carnaria*, and probably in certain cases the *œstrus*, or gad-fly; in tropical climates the *lucinia hominivora* is the most active.

The warm cavity of the nose provides a favorable surrounding for the hatching of the ova, hence the larvæ or maggots develop and become active in twenty-four hours after the deposit of the ova, and commence their work of destruction, invading the whole nasal cavity, and making their way into the accessory sinuses and communicating passages, destroying not only the mucous membrane,

<sup>1</sup> Edinburgh Med. Journal, Oct., 1856, vol. ii., pp. 371 and 372.

<sup>2</sup> Arch. générale, May, 1858.

<sup>3</sup> Recueil de Méd. Milit., 1865, 3e serie, t. xiv., p. 516 et seq.

<sup>4</sup> Ibid., 1866, 3e serie, t. xvii., p. 58 et seq.

<sup>5</sup> Virchow's Arch., Bd. 43, p. 98.

<sup>6</sup> Fricke u. Oppenheim's Zeitschr. f. d. gesammte Med., 1838, p. 276.

<sup>7</sup> Virchow's Arch., 1868, vol. xlv., p. 375.

<sup>8</sup> Wien. Med. Presse, No. 7, 1878, p. 209.

<sup>9</sup> "Élém. de Zoologie Médicale," Paris, 59, p. 212.

<sup>10</sup> Philadelphia Med. News, October 14th, 1882, vol. xli., p. 445.

<sup>11</sup> Daniel's Texas Med. Journ., Aug., 1887, p. 46.

<sup>12</sup> Ziemssen's "Encyclopedia," Amer. ed., vol. iv., p. 178.

but the periosteum also, and so giving rise to bony necrosis. If not arrested, they travel still farther, making their exit from the nose, and invading the cellular tissue of the face and scalp. Their exit from the nasal cavity is probably through the cartilages of the nose. In some of the cases reported by Coquerel, not only the septum, but the whole nose was nearly destroyed, which would indicate that bony tissue offered no very formidable bar to the progress of their destructive invasion.

**SYMPTOMATOLOGY.**—The earliest symptom due to the presence of maggots in the nose is a sense of formication, followed soon by frontal headache, which, increasing in severity assumes an exceedingly distressing character. Fränkel<sup>1</sup> quotes Weber, as stating that the agony of the pain in this affection has been so great that the victims have been driven to commit suicide. Muco-purulent bloody discharges set in very soon, and increase with the progress of the destructive operations of the larvæ. Epistaxis, oftentimes of a very serious character, may occur, probably as the result of invasion of some of the blood-vessels. Swelling of the nose and face occurs, as the maggots escaping from the nose burrow in these tissues. These swellings assume the character of localized abscesses, which may open spontaneously, or may be opened by incision, when masses of the creatures are removed, together with an escape of blood and pus.

In the commencement of the attack, constitutional symptoms are not marked, though on the second or third day, as the destruction goes on, general shock is present, as evidenced by the marked depression of the vital powers. Pus formation in the cellular tissue is evidenced by the occurrence of chilly sensations, or a well developed chill. The effect on the general system is shown in the rapid and feeble pulse, with fever setting in early, and as the disease progresses, this often shows a temperature of 102° to 103° or even higher. A fatal termination of the disease is due, probably in all cases to the supervention of meningitis, although it would seem that the very extensive suppuration going on in the cellular tissue of the face and scalp might result in a septic condition, sufficient to produce death without the occurrence of inflammation of the meninges. Meningitis in many cases is probably due to extension of the inflammatory process by continuity of tissue, after the invasion of the ethmoidal or sphenoidal sinuses.

**DIAGNOSIS.**—The diagnosis is comparatively simple, and one should be able to recognize the presence of these creatures, before any serious damage has been done, although in most of the grave cases the patients did not come under observation until serious mis-

<sup>1</sup> Op. cit., p. 179.

chief had resulted. While the maggots confine their activity to the nasal passages alone, their further progress can be arrested easily. When, however, they have invaded the accessory sinuses, or the cellular tissue, they are far more difficult to deal with. These cases relate entirely to the larvæ of the diptera. The other insects which are found in the nasal cavity, are comparatively harmless. Thus Cochran<sup>1</sup> reports a case, in which the expulsion of about fifty screw worms from the nose gave entire relief to a patient, suffering with apparently a severe influenza, with high fever; while Thiedemann<sup>2</sup> has collected evidence of the existence in the nose of centipedes, earwigs and larvæ of the beacon beetle. Another case of centipede in the nose was reported by Packard,<sup>3</sup> in which no marked symptoms resulted from its presence, although in a case reported by Maréchal as cited by Moquin-Tandon,<sup>4</sup> violent headache and profuse epistaxis occurred, resulting from its presence. Leeches have been found in the nose as cited by Mackenzie,<sup>5</sup> while lumbricoids have been ejected into this cavity, in the act of vomiting.

TREATMENT.—IN early days various drugs were recommended for use in these cases with probably little effect. During the investigations which Morel made in Mexico, on the subject of maggots in the nose, Dauzats, an apothecary's assistant, suggested the use of chloroform. This was diluted with an equal amount of water, and injected into the nose, with the result of destroying the larvæ in every case in which it was tried, where the creature had not burrowed beyond the reach of the drug. Mackenzie<sup>6</sup> suggests that this agent might be used in full strength, although the patient should be anæsthetized first, as otherwise the application would be too painful. Cloquet's case seems to have been cured by inunctions of mercury, even after the maggots had invaded the cellular tissues of the face and skin, and destroyed the eyes. Moldenhauer<sup>7</sup> suggests the use of a solution of bichloride of mercury. The immediate effect derived from the use of chloroform is so satisfactory, that the trial of other remedies will rarely be justified. In connection with this, the thorough disinfection of the cavity, with the use of douches and syringes for washing away, as far as possible, the larvæ themselves, together with the débris following their destructive process, is naturally of much importance.

<sup>1</sup> College Clinical Record, Phila., vol. iii., p. 245.

<sup>2</sup> "Von lebenden Wärmern und Insekten in den Geruchsorganen des Menschen," 1844

<sup>3</sup> Med. and Surgical Reporter, August 3d, 1878, p. 100.

<sup>4</sup> Op. cit., p. 217.

<sup>5</sup> Op. cit., p. 450.

<sup>6</sup> Op. cit., p. 448.

<sup>7</sup> "Die Krankheiten der Nasenhöhlen," Leipsic, 1886, p. 127.



When the maggots have reached the accessory cavities, these should be opened if necessary and feasible. Thus, it may become necessary to trephine the frontal sinus or to open into the antrum. This latter operation would preferably be done by the supra-alevolar operation. Localized abscesses on the face or scalp will be treated under the ordinary rules of surgical procedure.

## CHAPTER XXIII.

### SYPHILIS OF THE NASAL PASSAGES.

THE manifestations of syphilis that are met with in the nasal cavity, from a clinical standpoint are, (1) the primary lesion, (2) erythema or coryza, (3) the mucous patch, (4) the superficial ulceration, and (5) the gummy tumor leading to (6) deep ulceration and necrosis.

The division of syphilitic lesions into secondary and tertiary is a purely arbitrary distinction, in that the mucous patch and the superficial ulcer, which are usually regarded as secondary lesions, not infrequently occur in the later stages of the disease, while the gummata, with their resulting deep ulceration and necrosis, not infrequently occur quite early in the history of the malady.

#### THE PRIMARY LESION.

Chancre of the nose is naturally one of the rarest of lesions, and could only occur as the result of a most untoward accident. Thus in 2,244 cases observed by Bassereau, Clerq, Lefort, Fournier and Ricord, the lesion was found in the nose twice. In 292 cases observed by Fournier and Martineau, in no instance was the nasal mucous membrane the seat of the lesion. MacCarthy<sup>1</sup> cites one case of indurated chancre of the nose, while Rollet claims to have observed three cases, in which the primary lesion was situated at the entrance of the nares. The ordinary method in which this accident occurs, is by conveying the virus on the finger nail, as for instance, in a case reported by Moure,<sup>2</sup> the virus seems to have been inoculated upon the nasal septum by the finger nail, the source of the virus being a syphilitic lesion in a lewd woman, while in a case observed by Watson<sup>3</sup> the disease was contracted in the same manner by a wet-nurse. The source of the virus, however, in this instance, was in an affected nursing. The location of the chancre in these cases, as would be the natural inference, is upon the cartilaginous septum, in that it is in

<sup>1</sup> Thèse de Paris, 1844.

<sup>2</sup> *Revue Mensuelle de Laryngologie*, 1887, No. 7, p. 385.

<sup>3</sup> *Med. Times Gazette*, April 16th, 1881, p. 428.

this portion of the nasal cavity that abrasions are more frequently met with, which permit the introduction of the virus. In Watson's case, however, the chancre developed on the inner aspect of the ala. It would seem that when the nasal passages become the seat of a primary syphilitic lesion, the infective process assumes a somewhat more efflorescent character, and moreover, that the general febrile movement which attends the onset of the disease is of a far more aggravated character; as, in Moure's case, the ulcer presented a large granular mass, which bled easily upon touch, and which not only produced notable stenosis, but also pressed against the ala of the nose to such an extent as to produce external deformity, while in Watson's case the base of the chancre presented the appearance of a hard cartilaginous tumor, with an ulcerated surface which bled easily upon touch, and projected so far into the nostril as to produce notable stenosis.

DIAGNOSIS OF THE PRIMARY LESION.—Our clinical knowledge of chancre of the nose is based on so few recorded cases, that definite positive conclusions cannot be well drawn. The diagnosis, however, may be based on the gross appearance of the ulcer, in connection with the constitutional disturbance. The existence of an ulcer in the nose, with a peculiarly hard base, and granular surface, bleeding easily on touch, and limited in extent, would suggest either tuberculosis, malignant disease, or syphilis. Tuberculosis of the nose only occurs as secondary to a pulmonary deposit, and furthermore, an examination of the discharge would show the existence of the characteristic bacillus. Malignant disease, whether carcinoma or sarcoma, is rarely stationary, which is the case with chancre, and furthermore its development is liable to be attended with attacks of profuse epistaxis, a symptom not met with in chancre. The enlargement of the submaxillary glands on the side affected, always attends the development of a chancre, and is not usually met with except late in the clinical history of cancer, and rarely at all in sarcoma. The constitutional disturbance in these cases is very marked, and is characterized by febrile movement, general malaise, and depression of spirits, together with a peculiar cachexia which occasionally marks the onset of syphilis. Of course, the diagnosis is completely established if the characteristic cutaneous eruption comes on at the end of from six weeks to three months.

#### SYPHILITIC CORYZA OR ERYTHEMA.

This occasionally occurs in the early stage of syphilis, but presents no prominent features which enable us to recognize it as due absolutely to the specific virus, although in many cases, it would



seem that the turgescence of the mucous membrane presents a somewhat purplish or dark tinge, indicative of a venous congestion, while at the same time its surface presents a dryer aspect than that usually observed in connection with an acute rhinitis, the mucous coating itself being of a gray, somewhat brownish character, rather than the peculiar watery discharge, met with in an ordinary cold. The diagnosis as a rule, however, will depend on the clinical history of the case.

It occurs from three weeks to six months after the primary sore, and usually in connection with a roseola, although I think there can be no doubt that we may have a coryza in connection with the latter development of syphilitic disease, such as mucous patches, periostitis, or the superficial ulcer. It is present probably in but a small proportion of cases, although undoubtedly it is liable to be overlooked, in that it gives rise to but trifling annoyance to the patient, whose attention and apprehension are far more closely confined to the discovery that he has contracted constitutional syphilis.

#### THE MUCOUS PATCH.

This manifestation of syphilis shows an unmistakable tendency to develop in the region of muco-cutaneous junctions, such as the anus, the lips, or the vulva, hence we would naturally expect to find it about the margins of the nostrils, yet, as a fact, this is an exceedingly rare location for a mucous patch. Davassee and Deville<sup>1</sup> in reporting 186 cases of this lesion occurring in females, have found that in only eight cases was the nasal mucous membrane invaded, while Bassereau<sup>2</sup> showed that out of 130 cases of this lesion observed in males, the nasal mucous membrane was not affected in a single case. I am disposed to think, that there may be an element of uncertainty in this report of Davassee and Deville, in that there are various conditions in the nasal cavity which might simulate the appearance of a mucous patch, and render the diagnosis somewhat obscure. Thus a slight angular projection of the septum, with an erosion at its apex, I have seen present appearances almost identical with those of this lesion, or again, we occasionally see on certain irregularities on the surface of hypertrophied mucous membrane covering the turbinated bones, appearances far back in the cavity, which on first inspection might warrant the suspicion of syphilitic disease. Moreover, these writers made their report at a time when our methods of examin-

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<sup>1</sup> Arch. Générale de Med., 1845.

<sup>2</sup> Quoted in Internat. Encyclop. of Surg., vol. ii., N. Y., 1888, p. 403.

ing and treating the nasal passages were exceedingly primitive. Certainly in my own experience, I have never seen a nasal lesion in which I felt warranted in making the diagnosis of a mucous patch. If the lesion should occur, however, I take it, it should be recognized, as presenting the same appearances as a mucous patch when seen in other portions of the air tract. Its existence, however, would probably be marked by no notable symptoms, in that, whereas a mucous patch in the oral cavity is liable to be a source of no little annoyance, on account of the constant functional activity of the parts, and the irritating action of food and drink, in the nasal cavity, thoroughly protected by its bony walls, and subjected to no functional movements, it would give rise probably to no notable subjective symptoms.

### THE SUPERFICIAL ULCER.

In the superficial form, we meet with an ulcerative process in the nasal cavity, commencing apparently in the surface of the mucous membrane, which invades the tissue by a slow process of destruction, spreading laterally, and also to a very slight extent deeply. This is an exceedingly rare lesion, although undoubtedly met with. It occurs usually in what is called the secondary stage, namely from one to three years after the primary sore, and its occurrence is explained by the breaking down of a mucous patch. Now, as already shown, a mucous patch in the nose is not only a very rare, but a somewhat dubious occurrence. I am disposed to think that a superficial ulcer belongs to a later stage of syphilitic disease, and that it is due to the breaking down of a superficial gummatous deposit. That we have an ulceration of this form, differing not only in its gross appearances, but in its clinical history, from the deep ulcer, cannot be questioned, and belonging, as before stated, to the later stages of the disease, I think we must assume that we may have a gummatous infiltration of the superficial layers of the mucous membrane, which breaking down, gives rise to this form of ulcerative action. The microscopic appearances, moreover, of a section of this form of ulceration, as shown in Fig. 101, would seem to confirm this view. The primary gummatous infiltration being superficial in character, would give rise to no notable symptoms, which should call attention to a disease going on in the membrane, and furthermore, would present no notable appearances on direct inspection, hence our attention is first directed to the fully developed ulcer. This form of ulcer is usually met with on the septum, although occasionally it may be found on the floor of the nose, or on the surface of the turbinated bodies.

Its borders are moderately well defined, and the mucous membrane surrounding it perfectly normal in appearance, there being no areola of redness. The edges of the ulcer are neither sharply cut nor depressed. Its surface, however, is somewhat depressed in the centre, although its periphery is usually flush with the surrounding membrane. Its surface is covered with a coating of thick, stringy and grayish-yellow muco-pus, usually discolored by the deposit of impurities from the inspired current of air. If this is removed, the cleansed surface would show a grayish-pink color. It is feebly sensitive to the touch, and bleeds easily. It shows no marked tendency to extend, and its destructive activity is exceedingly feeble. Occasionally, the superficial ulcer would seem to extend deeply, and result in an involvement of the periosteum and an exposure of



FIG. 101.—Syphilitic Ulcer at Muco-cutaneous Junction. *E*, Stratified epithelium; *C*, fibrous connective tissue with inflammatory nests; *U*, ulceration penetrating the connective tissue; *G*, Gummatous infiltration with scanty blood-vessels; *A*, artery invaded by syphilitic endarteritis; *B*, remnants of connective tissue bundles.

bone. I doubt if this is really due to an extension of the ulcerative process, because, as before stated, as a rule, the superficial ulcer does not extend, but contents itself with the mischief accomplished by the breaking down of the original gummatous deposit in the superficial layer of the membrane. This destruction of deeper tissues, with the resulting necrosis of bone, is due, as has been so clearly demonstrated by Schuster and Sanger,<sup>1</sup> to the fact that coincident with, or even later than the superficial gummatous deposit, there occurs a gummatous deposit in the deep layer of the membrane, which results in the breaking down of the deeper tissues and the setting in of an ulcerative process there, after the superficial ulcer has fully developed.

That the superficial ulcer is due to the gummy deposit, I think,

<sup>1</sup> Vierteljahresschrift fur Derm. und Syph., Jahrg. iv. Wien, 1877, Hft. I. & II., p. 92.



is further shown in the fact, that the administration of mercury has but feeble influence in controlling the morbid process, but that it yields promptly to the administration of iodide of potassium, as is the case with the deeper gummatous deposits.

### THE GUMMY TUMOR.

Under this designation ought to be included those manifestations of late syphilis which indicate an exceedingly active condition of the specific virus in the system, and under which the mucous membrane becomes the seat of a deposit of gummatous material, which thoroughly infiltrates the whole thickness of the membrane, involving both its superficial and deep layers, resulting in the development of a large tumefaction in the membrane. No portion of the nasal cavity is free from this deposit, although, in the large majority of instances, the deposit occurs on the septum, involving both the bony and the cartilaginous portions. It may also occur on the turbinated bones, or the floor of the nose, no portion of the cavity being exempt from its invasion. The gummatous deposit shows a more or less well-marked tendency to rapid degeneration into an ulcerative process, depending somewhat on the locality of the deposit. Thus, in the pharynx, owing to its exposed situation, and to the fact that the parts are subjected to constant functional activity, the development of the gummatous deposit into an ulcerative process is so rapid, that a gummy tumor is rarely observed in this region. In the nasal cavity, on the other hand, a gummy tumor is so thoroughly protected from any extraneous influence, that the morbid process is exceedingly slow, and the existence of the tumor is usually recognized before ulcerative action has taken place. This lesion belongs essentially to what is called the tertiary stage of syphilis, namely that from five to fifteen years after the primary lesion.

SYMPTOMATOLOGY OF THE GUMMY TUMOR.—Where the deposit occurs upon the septum, it does not usually give rise to any marked pain, although there is usually a more or less well-marked sense of discomfort, with nasal obstruction. When the deposit occurs on one of the turbinated bones, on the other hand, the pain is apt to be more marked, and assumes the same character which accompanies a like process in other portions of the body, namely in being notably aggravated at night. The pain is of a deep boring character, and is usually very distressing. During waking hours, there is a marked diminution, and in many cases complete relief from this symptom. Ordinarily the symptoms are sufficiently prominent to direct the attention of the patient to the part.

DIAGNOSIS.—A gummy tumor of the turbinated tissues is not easily recognized on gross inspection, in that they are usually small in size, and situated well back in the nasal cavity. In these cases, the diagnosis will be based on the previous history of syphilis, in connection with stenosis, deep-seated pain, extending to the side of the face, with nocturnal exacerbations, together with the existence of a tumefaction over one of the turbinated bones, usually the lower, which, on inspection, presents simply the round swollen aspect of hypertrophied tissue. The impact of the probe, however, reveals the tumefaction to be of a more solid character than turbinated hypertrophy.

When the morbid process develops upon the septum, as before stated, it attains a much larger size than when it occurs in other portions of the cavity, and presents as a large, rounded, prominent mass, projecting from the wall of the septum, and more or less completely occluding the nasal passages, the prominence of the mass often impinging upon the turbinated tissues of the opposite side. In contour, it is round and smooth, and covered with a mucous membrane, usually of a normal tint, or, on the other hand, the membrane may present a bleached appearance, due to the fact that the tumor developed underneath it, so far stretches the covering membrane, as it were, as to produce an exsanguinated condition. In other cases, we may find it showing evidence of deep venous injection, giving rise to a reddish or purplish hue. This, however, is more characteristic of the smaller growths. In a certain proportion of cases the lesion is found occupying both faces of the septum, although, as a rule, I think, it is unilateral. There is no marked tenderness on pressure, and the growth to the touch presents a somewhat hard, semi-elastic, cartilaginous condition. The mucous membrane covering the growth is intact, unless, possibly, there be evidence of slight erosion, not specific in character, at the apex of the tumor. There are two conditions with which a gummatous condition of the septum may be confused, namely, deflected septum and sarcoma. In the case of a deflected septum, the presenting tumor is much more hard and dense to the touch, and, furthermore, will show a corresponding concavity on the opposite side, which is not present in the case of a gumma. These cases, however, frequently present appearances which very closely simulate a sarcoma, and in one case, certainly, in my own experience, a diagnosis of sarcoma was ventured upon, until the microscope revealed the mistake. As a rule, however, a sarcoma presents a softer, more pedunculated mass, bleeding easily upon touch, and is somewhat movable. Moreover, its attachments are apt to be much higher up in the cavity. An absolute diagnosis can only be made

by the removal of a portion of the tumor for examination, together with the clinical history of sarcoma, especially with reference to epistaxis, which is a characteristic of malignant disease, and never occurs in connection with a gummatous deposit. Moreover, a gumma is usually a sessile tumor.

It would scarcely seem possible to mistake a gumma for a fibrous tumor, and yet Van Domelin<sup>1</sup> reports a case of fibrous polypus, attached to the outer wall of the nasal cavity, which disappeared completely under the administration of the iodide of potassium. There can be little question that the diagnosis was incorrect, and that he had to do with a case of syphilitic gumma, especially as he states that subsequently there was necrosis of the bones of the nose.

**PATHOLOGY.**—The essential pathological lesion, which constitutes a gummatous deposit, is an infiltration of the mucous membrane with small round cells, or inflammatory corpuscles, which invade not only the epithelial layer, but also the mucosa proper and the deep layers of the membrane or periosteum, and even the bone tissue itself. The extent and distribution of this infiltration would seem to depend somewhat on the activity of the specific virus in the system. Thus as we have seen, where the activity of the virus is limited, the cell infiltration only invades the epithelial layer of the membrane, giving rise to the superficial ulcer, the ulcerative process being due to the crowding together, as it were, of the inflammatory corpuscles in this layer, thus causing a localized necrotic process, in other words, the ulceration is confined to the epithelial structures of the membrane. On the other hand, where we have a greater activity of the specific virus in the system, the cellular infiltration, which we call a gummatous deposit, invades the whole thickness of the mucous membrane, giving rise to more or less prominent tumefaction. The membrane is crowded, as it were, with these small round cells, which so far encroach upon the periglandular structures, as to obliterate the glands, probably by pressure, thus resulting in their destruction and the exfoliation of their lining epithelium. In addition to this, the same process invades the vascular structures of the membrane, more especially the nutrient arteries, giving rise to an infiltration of the arterial coats, and particularly the inner, by which their calibre is markedly diminished, and finally completely obliterated, partly, perhaps, as the result of pressure from without, but, in the main, as the result of a genuine endarteritis obliterans which is set up by their presence. According to Sanger,<sup>2</sup> we occasionally find, in the deep layers of the membrane, in addition to the small round-cell infiltration, a certain

<sup>1</sup> Jour. des Conn. Med. Prat. et Pharm., 1858-9, vol. xxvi., p. 425.

<sup>2</sup> Loc. cit.



number of spindle cells, deposited in or near the periosteal layer. Sanger further states, that, as the result of the obliteration of the arteries, we have a damming back of the blood, which may give rise to a hyperæmic condition of the tissues beyond, and that this is followed by localized extravasations of blood, and, as an occasional ultimate result, small cyst formations.

COURSE AND DURATION.—A gummy tumor in the nasal passages runs a somewhat chronic course. This is due largely to the fact of its location, lying as it does in the inclosed cavity of the nose, where it is subjected to neither the irritation of functional movements nor external influences. It develops somewhat rapidly, attaining its full growth in probably a very few days. The syphilitic explosion, however, seems to expend itself in the development of the lesion, for after the growth has attained its full size it may remain quiescent for weeks and even months. In one case which came under my own observation, the tumor had existed for twelve months, apparently without great change, giving rise merely to the ordinary symptoms of nasal stenosis with nocturnal pains, and some occasional coryza. This disposition, however, is not to be relied on, as I think the tendency is to break down much earlier than this. Probably a duration of six months is to be regarded as beyond the average. As the result of the peculiar anatomical features of the deposit, already described, by which the normal structures of the membrane are crowded upon, as it were, by the inflammatory corpuscles, but more especially as the result of the obliteration of the arteries, the subsequent history of a gummatous deposit consists of a breaking down at its centre, which, gradually extending to the surface, results in the development of an ulcerative process. This is due directly to the fact that the blood supply to the part is completely arrested. This necessarily must be a somewhat slowly developing process, for as we have seen a gummy tumor may last for three months or even longer. Hence, we naturally infer that the endarteritis is a progressive lesion, and that the complete obliteration of the arteries is only a final result. When this, however, occurs, nutrition is arrested in the mass, necrosis ensues, and the whole of the tissue, whose nutrition depended previously on the blood supply from the diseased artery, becomes necrotic, breaks down and sloughs away, leaving the characteristic broad crater-like ulcer which we recognize as the deep ulcer of syphilis.

#### THE DEEP ULCER OF SYPHILIS, AND BONY NECROSIS.

This lesion, arising directly from a gummy deposit, presents the same clinical history as regards its location and as to the time of

its occurrence following the primary lesion as that of the condition from which it arises, and belongs, therefore, essentially to the tertiary stage of the disease. It occurs usually from ten to fifteen years after the primary sore, although among races in whom syphilis has been prevalent for ages without the controlling influence of proper treatment, it seems to possess a special virulence, and hence runs a more rapid course. Thus Chinese syphilis is commonly regarded as one of the most virulent forms of the disease, as far as clinical observation shows it as contracted by members of the European races, and hence runs an exceedingly rapid course, the tertiary symptoms developing very early. Furthermore, Spillmann<sup>1</sup> has made a similar observation with reference to the disease as contracted by French troops in Mexico, who presented at the Val de Grace Hospital on their return, where tertiary lesions set in, in one case six months after the primary lesion, and in two cases within twelve months. Mackenzie<sup>2</sup> makes a like observation with regard to the Arabs. This peculiar feature of syphilis, however, is exceedingly rare among the European races, although Mauriac<sup>3</sup> has observed a deep ulceration, followed by necrosis of the nasal bones, seven months after the primary lesion.

Its most frequent location is fortunately upon the septum, in that, when occurring on the turbinated bones, it is less amenable to treatment, pursues a more chronic course, and results in more extensive destruction of tissue. The first effect of the breaking down of the gumma is to involve the whole thickness of the mucous membrane, and the periosteum as well, in the ulcerative process. The ulceration does not necessarily at first involve all the tissues which were affected by the gummatous deposit, but only such tissues as receive their nutrition from the artery involved in the obliterating process, and which thus become necrotic. After the ulcerative process, however, becomes established, there is shown a tendency to extend by a slow process of destruction, both laterally and deeply, resulting thus in the destruction of neighboring tissues, and the involvement of the bone beneath. Or, in case that there has been a primary gummatous deposit in the bone, we have a bony necrosis, coincident with the breaking down of the gumma and the establishment of the ulcerative process in the mucous membrane. Or, again, the deposit may be primarily in the bone, and the breaking down of the bony gumma may be the direct cause of the ulcerative process in the softer tissues. The destruction of tissue is by no means rapid, and the extension of the ulcer is prob-

<sup>1</sup> Quoted by Mackenzie, "Diseases of the Throat and Nose," vol. ii., Amer. ed., Phila. 1884, p. 391.

<sup>2</sup> *Op. cit.*, p. 391.

<sup>3</sup> Quoted by Mackenzie, *op. cit.*, p. 391.

ably due, to a large extent, to the subsequent breaking down of those portions of the membrane which have previously become infiltrated with the gummatous deposit, and in which the ultimate obliteration of arteries occurs later than in the tissues involved in the earlier ulcerative action. For I think it is exceedingly doubtful if we ever have a further gummy deposit, after the first deposit occurs, the syphilitic explosion, as we may call it, expending itself when the first gummy tumor develops, as before stated. After all the tissues involved in the original gummy deposit have taken on the ulcerative process, there is very little tendency for the ulcer to extend, and furthermore I have never known a deep ulceration of syphilis in the nose to take on anything like serpiginous action. An additional feature which I think is characteristic of the deep syphilitic ulcer, is that it shows a marked hesitancy in transgressing anatomical boundaries. This, probably, is due to the fact above stated in regard to the ulcerative process being limited by the original gummy deposit. Certainly these ulcers do not extend beyond the nostril to the skin, nor do they extend beyond the posterior nares into the pharynx.

**SYMPTOMATOLOGY OF THE DEEP ULCER.**—With the breaking down of the gumma, the peculiar boring pains with nocturnal exacerbations disappear, and the prominent symptoms now consist of those due to the ulcerative process, namely a profuse sanguinopurulent discharge mixed with the blackened shreds of necrotic tissue. These show a tendency to accumulate on the face of the ulcer in large masses, which, drying up, form crusts which are discharged periodically in the shape of casts, as it were, of the crater-like cavity of the ulcer. These crusts are exceedingly offensive, of a most nauseating appearance, and are attended with an odor which is intolerable, especially where the disease has extended to the bone, giving rise to necrosis, in which case the odor is characterized by a penetrating stench that is almost unendurable. This odor is present about the person of the patient, not only at the time of the discharge of these crusts, but at all times, and is quite characteristic, differing in every way from the odor of an ozæna dependent upon atrophic rhinitis which, as we have already seen, is not due to necrosis, but simply to the decomposition of mucus. Here we have the odor of decomposing animal matter, which cannot well be described, but when once experienced is not easily forgotten. Occasionally there are discharged with the bloody crusts small spiculæ of bone, and where the disease has existed for a long time, even large sequestra may be expelled, either through the nose or through the pharynx. As the ulcer extends, the crusts which adhere upon its surface become, of course, much larger, and their



discharge becoming more difficult, there finally ensues a condition of things in which the cavity is largely blocked up with a great mass of bloody pus and necrotic tissue, which the patient cannot void, and hence it remains in the cavity, giving forth a hideous odor until relief is obtained by the interference of the surgeon.

The sensibility of the nasal cavity seems to be notably diminished in syphilitic disease, in that the presence of these crusts seems to give rise to no special symptoms, such as sneezing or watery discharge. Spencer Watson<sup>1</sup> reports a case in which lachrymation was quite a prominent symptom, due to the fact that the lachrymal duct was involved in the ulcerative process and thereby obstructed. The sense of smell is usually abolished or markedly impaired, simply as the result of the occlusion of the nasal passages by the accumulation of crusts, thereby obstructing the approach of odorous particles to the olfactory tract, although this might be explained by the involvement of the olfactory nerves in the syphilitic lesion, as has been observed by Gros Lancereau.<sup>2</sup> A similar case has been reported by Bayle and Kergaradec.<sup>3</sup>

Deep syphilitic ulceration, unless arrested very early in its career, results in necrosis of the bony tissue or cartilage beneath. If it occurs upon the turbinated bones, the necrosis involves no external deformity, but confines itself simply to the destruction of such portion of the bone as may be involved in the original gummatous deposit. Where the ulceration occurs upon the cartilaginous septum, necrosis occurs very early, and runs a somewhat rapid course, usually involving the whole of the cartilaginous portion of the septum in the destructive action. The result of this is that the tip of the nose is thus so far robbed of its support that it sinks in, producing the peculiar deformity so easily recognized as the result of this lesion. In certain cases, although exceedingly rare, the destruction of the cartilaginous septum is attended with a destruction of the columna of the nose, thus converting the two nostrils into one single orifice upon which the sunken tip of the nose falls over like a flap, as it were. This, however, is an exceedingly rare accident, for, as before stated, syphilitic ulcers show a marked hesitancy in transgressing anatomical boundaries, and the ulcerative process is limited to the destruction of the cartilage alone. If the original gummatous deposit is circumscribed in extent, the mischief done is confined merely to producing a perforation of the septum without causing any external deformity. Where the ulceration and necrosis involves the bony septum, it may confine itself to the destruc-

<sup>1</sup> *Med. Times and Gaz.*, 1871, vol. i., p. 58.

<sup>2</sup> "Affections Nerveuses Syphilitiques."

<sup>3</sup> Cited in the "International Encyclop. of Surgery," vol. ii., p. 415.

tion of a portion of the septum, or complete destruction of the vomer may take place without any external deformity. In other cases, however, the nasal bones are also involved in the morbid process, probably as the result of the original deposit of gummatous material in the bones themselves, and not to an extension of the diseased action from the vomer. Where the nasal bones are destroyed, we have resulting an external deformity quite as noticeable as the one previously described, yet differing from it in a very marked degree. The bridge of the nose now sinks in, leaving the tip of the nose intact. The sinking in of the bridge, is attended with a certain amount of atrophy of the tissues of the external nose, and there is left simply a rounded elevation representing the original bony bridge, which thus throws the unchanged nasal tip into greater prominence. I have never seen this form of external deformity result from gumma of the nasal bones alone, if such a thing ever occurs. The process, in every case that has come under my observation, involved the complete destruction of the bony septum in connection with the nasal bones. The nasal processes of the superior maxillae are usually also involved to a certain extent in the same necrotic process which attacks the nasal bones.

Schech<sup>1</sup> mentions erysipelas as a complication of syphilitic necrosis in the nose. This is, certainly, a most rare complication, and not one to be anticipated, as the morbid processes are in no way connected from a clinical standpoint.

DIAGNOSIS OF THE DEEP ULCER.—After the ulcerative process has commenced in a gummy tumor, the destruction of tissue goes on very rapidly, until the whole growth has broken down, and developed into the characteristic deep ulcer, or tertiary ulcer of syphilis, which now presents appearances so typical in character as to render the diagnosis comparatively easy, although the subjective symptoms are usually sufficient to establish the diagnosis beyond much question. It is a deep, excavating ulcer with ragged overhanging edges. The mucous membrane surrounding it is reddened, and the arteries congested. The surface of the ulcer is covered with dark, offensive-looking crusts, composed of blood and pus, mixed with black necrotic tissue, the removal of which reveals the characteristic excavation. The surface of the ulcer will now be shown to be covered with dirty-looking yellow pus, in considerable quantities. The areola of the ulcer is characteristic in its exceedingly bright and glassy-looking red color, which extends some distance beyond its border. The gross appearances are quite sufficient to establish the diagnosis.

It has already been shown that the deposit extends very deeply

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<sup>1</sup> "Dis. of the Mouth, Throat, and Nose" Eng. ed., Edinburgh, 1886, p. 248.

through the mucous membrane, and usually involves the deep layer or periosteum. Hence, the bone is usually found to be denuded—a fact which is easily established by the use of a probe, which should always be used both for determining the existence of denuded or necrosed bone, and furthermore to establish the extent of tissue which the ulcerative process involves. If the disease has existed for a sufficient length of time to result in the formation of a sequestrum, this fact is also determined by means of the probe, as the mobility of the mass is thus easily determined. Schuster<sup>1</sup> suggests as a further aid to diagnosis, that the patient be anæsthetized, and that the nasal cavity be explored by means of the finger passed through the anterior nares. I doubt if this is ever necessary or advisable, as all the needed information can be better obtained by means of ocular inspection, and the use of the probe. The ragged tissue about the edges of the ulcer occasionally develops a typical myxoma, though small and stunted in size, or in rare instances, groups or masses of polypi will develop, which for a time may obscure the diagnosis. Their removal is easily accomplished, when the diseased action beneath is readily made manifest. In addition to this, a certain exuberant granulation-tissue is noticed in the majority of cases, more or less efflorescent in character, developing upon the ragged ulcerating edges, and extending over the diseased surface of the ulcer. This is somewhat rapid in growth, and in many cases very exuberant, more or less completely filling the crater-like cavity of the ulcer. This presents the typical appearance of granulation tissue, except that it is somewhat redder, and is usually covered with the offensive secretion from the ulcer. It is of a somewhat yellowish color, and bleeds easily on being touched with a probe.

Another appearance quite characteristic of the tertiary ulcer in the nose is the accumulation of a peculiar, clear-white substance, having much the appearance of potted cheese. This is found above and beyond the ulcerative process, and seems to consist of mucus which has been imprisoned in the narrow portion of the nasal cavity, and has undergone cheesy degeneration. This comes away in large flakes upon cleaning the ulcer. This condition is almost pathognomonic of a syphilitic ulcer, as I have rarely seen it in any other form of diseased action on the nose.

COURSE AND DURATION OF THE DEEP ULCER.—As before intimated, I am disposed to think that the deep ulcer of syphilis simply involves those tissues which had originally been the seat of the gummy deposit, and that there is no tendency to the involvement of neighboring tissues by the extension of the ulcerative process.

<sup>1</sup> Vierteljahresschrift für Derm. u. Syph., Wien, 1878, p. 213.



The disease runs an essentially chronic course, after the ulcer has been established, owing to the fact that the morbid process has extended to the bone, resulting in its denudation and subsequent necrosis. Certainly, if there is any extension of the ulcer itself, it is due to the fact of the existence of necrosed bone, acting as an irritant, or foreign body, which keeps up this slowly progressing ulcerative action in the mucous membrane covering the bony sequestrum. Whether the original gummy deposit be in the bone, or is simply confined to the mucous membrane or the periosteum, the necrosis is a necessary result. In the former case, however, it would involve a larger, and perhaps more rapid ulcerative action, in that the deposit in the bone-tissue itself would indicate a greater activity of the syphilitic virus in the system.

If the disease is located upon the vomer, it may result finally in producing simply a bony sequestrum, which causes a perforation of the vomer, or it may involve the whole bone, giving rise to its complete destruction, and thereby the introduction of a new element in the disease, in that, as the result of the destruction of the vomer, a certain portion of the hard palate is involved in the process, resulting in perforation, and the appearance of the disease in the roof of the mouth. I am disposed to think that this complication arises as the result of the original gummy deposit involving a small portion of the floor of the nose, or the upper surface of the hard palate, and not to an extension of the disease, although it possibly might be accounted for by the pus secreted by the ulcerative process on the vomer, making its way downward beneath the periosteum and the floor of the nose, and thus producing a denudation of bone and subsequent necrosis there.

As regards the danger of external deformity resulting from syphilitic disease in the nose, this I think is clearly indicated by the extent of the original lesion. Thus, deformity may arise from the destruction of the bony or cartilaginous septum, or the nasal bones, or both. If the original gummy tumor has involved these, and ulcerative action has resulted, giving rise to denudation of bone and necrosis, an external deformity is inevitable. In other words, all means of affording nutrition to the bone have been destroyed, and it is only a question of time, before the bone breaks down. The only time when this tendency can be arrested is in the stage of gummy deposit, and possibly the very early stage of ulcerative action. The prognosis, then, as regards external deformity, depends entirely upon the location and extent of the ulcer. Thus even a small ulcer involving the nasal bones would result in deformity, while a large ulcerative process, located upon the posterior portion of the vomer, involves no danger whatever of such an

accident. Again, an ulcer of considerable size, located upon the central portion of the cartilaginous septum, may produce a large perforation, leaving a mere ring of cartilage. If, however, this ring is complete anteriorly, an external deformity need not result. If, on the other hand, the disease extends to the anterior edge of the cartilaginous septum, a sinking in of the tip of the nose is inevitable. As before intimated, syphilitic disease shows a marked hesitancy in transgressing anatomical boundaries. Original syphilis of the nose, as a rule, remains a syphilis of the nose. An extension, for instance, through the anterior nares to the integument never directly occurs. The same, I think, can be stated, in regard to any extension into the pharynx. As we have already seen, apparent extension to the oral cavity is the result of an accident, and is not really an extension of the disease. Baratoux<sup>1</sup> has reported a somewhat remarkable case, in which syphilitic disease gave rise to the destruction of the septum, both lower and middle turbinated bones, and the whole body of the sphenoid, the latter being expelled through the fauces. This, of course, is not to be regarded as an extension of the disease, since all of these parts were the original seat of a gummy deposit, which resulted in ulceration and necrosis. An interesting question, in this connection, is the danger of septic absorption, from the exposed bone, constantly bathed, as it is, in a purulent fluid. This is ordinarily regarded as constituting a condition especially favorable for the production of septic infection, and yet as a matter of clinical observation I think this complication is an exceedingly rare one. Herman Weber,<sup>2</sup> however, has reported a case of syphilis of the nose, in a man aged twenty-four, in whom a certain cessation of the sanious discharge from the nose was followed by rigors, headaches, somnolency, carphologia, ptosis, and finally hemiplegia, ending in death at the end of thirteen days. *Post-mortem* examination revealed thrombosis commencing apparently in the left ophthalmic vein, and extending to the sinuses at the base of the brain, and purulent meningitis with secondary abscesses in the lungs, liver, and purulent effusion in the pleural cavity. This case of Weber's establishes beyond question the possibility of a general septic infection, having its origin in necrosis in the nasal cavity, and yet in Baratoux's case the exposure of bone was enormous in extent, while there were no recorded evidences of septic poisoning or cerebral symptoms. While undoubtedly cerebral symptoms present in many cases of syphilis of the nose, I quite agree with Schuster<sup>3</sup> in his statement, that these are usually to be regarded as reflex manifestations, rather than as evidence of brain lesion.

<sup>1</sup> Revue mensuelle de laryngologie, 1883, p. 225.

<sup>2</sup> Med. and Chir. Trans., vol. xliii., p. 182.

<sup>3</sup> Loc. cit., p. 232.

## TREATMENT.

*The Primary Lesion.*—In dealing with a hard chancre in the nose, there are no indications for treatment, other than the use of simple lotions, merely for the purpose of keeping the parts clean. If the ulcerative process is active, this may be controlled by the local application of iodoform or iodol, either in the form of an ointment or in the form of a powder of the strength of one drachm to the ounce. If the diagnosis has been fully established by the appearance of the characteristic syphilitic eruption, the patient should be put on a course of mercurial treatment. Caustics should not be used, in that no good purpose is thus accomplished. Furthermore, internal medication should not be resorted to, until the diagnosis is fully established, by the appearance of the secondary symptoms. This is of special importance, in that the diagnosis of a nasal chancre must necessarily be to an extent uncertain.

*The Coryza or Erythema.*—A syphilitic coryza subsides readily under the use of general medication, and as a rule requires no local treatment. If, however, it should prove obstinate or persistent, resort may be had to the same methods of treatment which govern cases of simple acute rhinitis.

*The Mucous Patch.*—The indications for the treatment of a mucous patch here, as elsewhere, consist in its thorough and complete destruction, by means of chromic acid or some equally efficient caustic, applied daily until the morbid process is completely arrested.

*The Superficial Ulcer.*—The essential feature of treatment in this form of ulceration consists in the administration of iodide of potassium, commencing with a dose of fifteen grains, three times daily, after meals. Its efficacy is easily tested by watching the progress of the ulcer. If the morbid process is not immediately brought under control, the dose should be increased on the third or fourth day to twenty grains, and if necessary at the end of a week to twenty-five grains, although cases are very rare in which the administration of doses larger than fifteen grains will be demanded in this form of ulcerative action, as I am disposed to think a superficial gummatous deposit indicates that the specific virus in the system is not specially active. In connection with the iodides, either the bichloride or biniodide of mercury is to be administered, in doses of one-sixteenth of a grain three times a day. After the ulcer is completely healed, the further administration of the iodides is not indicated. The mercurial treatment, however, of course, should be continued for from eighteen months to two years.



The patient should be seen daily and the progress of the disease watched with care, not only to test the efficacy of the general remedies, but also to guard against the very possible mistake of regarding a deep ulcer as one of the superficial variety. The surface of the ulcer should be kept thoroughly clean by the use of some simple cleansing and disinfectant lotion, and its surface daily powdered with iodol or iodoform.

*The Gummy Tumor.*—The early recognition of a gummy tumor is of special importance, in that, if recognized before the ulcerative process commences, its treatment is attended with the best of results. Few lesions in syphilis are more directly amenable to internal medication than this manifestation, in that its disappearance under the administration of iodide of potassium is rapid and complete. I do not entirely agree with those who advocate the use of this drug in extremely large doses. Certainly in this lesion, as manifested in the nasal cavity, my own experience goes to show that the administration of twenty grains of iodide of potassium, three times daily, is quite sufficient to accomplish the desired end. I do not say that all cases can be controlled by this amount. The administration of the remedy, however, should be commenced with this dose, administered three times daily. The manifestation of the disease is so directly under immediate ocular inspection that the effect of the remedy can be easily watched. If at the end of the second day a notable subsidence in the tumor is not observed, the dose should be increased to thirty grains or even to forty. As a rule, however, the twenty grain dose will prove sufficient. This remedy is always somewhat irritating to the stomach. I think, however, this is often due to the fact that it is not sufficiently well diluted in its administration. The amounts above given, should be administered in at least a wineglass of water to each dose. The administration of the full dose of the iodide is to be continued until every vestige of the gummy deposit has disappeared, and then it is to be given in ten-grain doses, administered three times daily, for ten days. Occasionally we find that even small doses of the iodides are not tolerated, on account of the excessive irritability of the stomach which it causes. This may be overcome by administering each dose of the drug in a wineglass of milk. If this is not sufficient, it may be given for a certain period by the rectum, although this can be continued for but a short time, as the drug exhibits the same irritating qualities in this region. Better results in this direction, I think, can be obtained by attention to the diet. Perhaps the best plan is to restrict as largely as possible the use of vegetable food, putting the patients mainly on an albuminous diet, while at the same time the use of tea and coffee is to an extent re-

stricted, and indulgence in alcohol and tobacco entirely interdicted. Or, we may place the patient largely or exclusively on a milk diet for a time, the object being, that while nourishment is administered in thoroughly ample quantities, the stomach shall be taxed as little as possible.

In rare cases, a change of climate seems to overcome this intolerance, but it is not an infrequent experience, to find that this intolerance of the iodides resists all our ingenuity in devising methods for overcoming it. We may, therefore, with good results, occasionally intermit the administration of the drug, and put the patient under a course of general tonic treatment for a week or ten days, giving one of the following:

R Ferri et quin. cit., . . . . . 3 iiss.  
Elixir. simplicis, . . . . .  $\frac{3}{4}$  iv.

M. S. Teaspoonful three times a day before meals.

R Ferri et ammonii citratis, . . . . . 3 iij.  
Liquor. sodii arseniatis, . . . . . 3 iss.  
Syrupi, . . . . .  $\frac{3}{4}$  iss.  
Aquæ, . . . . . ad  $\frac{3}{4}$  iv.

M. S. Teaspoonful three times daily after meals.

R Ferri et strychn. phosphatis, . . . . . 3 ij.  
Tinct. calumbæ, . . . . . ad  $\frac{3}{4}$  iv.

M. S. Teaspoonful three times a day before meals.

Another serious obstacle, occasionally met with in the administration of the iodides, is the production of iodism, which I have seen resulting from the administration of even small doses, giving rise to an intense irritation of the mucous membrane of the whole upper air-tract as well as of the conjunctivæ. This difficulty, however, is readily overcome in most cases by adding to each dose of the iodide, ten grains of the bromide of potassium.

I am disposed to think mercury has but very little effect upon a gummy tumor, and although there is good authority for the doctrine, that in this stage of the disease its administration should be combined with that of the iodides, I am disposed to think it had best be avoided, until the iodides have fully accomplished their purpose, when, of course, it should be administered, after the manner to be described later. There is no local treatment specially indicated in the management of a gummy tumor. Seiler<sup>1</sup> has reported two cases of gumma of the septum, in which the tumor was removed by means of the curette. The first operation was done under the mistaken idea that he was dealing with a sarcoma; the second was operated upon designedly. I see no special

<sup>1</sup> International Journal of Surgery and Antiseptics, vol. i., No. 2, April 1888 p. 65.

objection to this, nor do I see anything to be gained. In a case which came under my own observation in 1886, a gummy tumor completely obstructed one nasal passage, and was operated upon with the nasal saw, under the impression that I was dealing with a deflected septum. My mistake was immediately recognized, when I found my saw going through the growth, almost at a single cut, so soft did I find it, which led me immediately to suspect the existence of sarcoma. The subsequent history of the case showed that it was syphilis. No untoward result followed, and yet I am quite confident that the tumor might quite as easily have been dissipated, by the administration of proper remedies, without involving the necessity of a complete restoration of the mucous membrane over a somewhat broad area of the septum following an operation.

*The Deep Ulcer.*—The treatment of the deep ulceration demands the thorough cleansing of the part, by the removal of all obstructing crusts, by the use of the douche or syringe, using for the purpose any simple carbolized wash. If the crusts are large and not easily removed, a probe should be used with a large pledget of cotton to detach the masses, or they may be withdrawn by means of the forceps. After the ulcer is thoroughly cleansed, any necrosed tissue which is found, should be removed by means of the snare or a sharp spoon. If polypi be found, they also should be removed in the same manner. After this, the ulcer should be filled, by means of the insufflator, with powdered iodoform, or better still, as avoiding its exceedingly offensive odor, iodol, which is equally prompt of action on ulcerated surfaces. This procedure should be repeated daily, until healthy action is established in the diseased tissues. At the same time, the patient should be directed to make use, three or four times daily, by means of the nasal douche, or by simple insufflation from the palm of the hand, of a cleansing lotion, as follows:

R	Acidi carbolic,	.	.	.	.	.	.	grs. vi.
	Sodii biborat.,	.	.	.	.	.	.	grs. xxv.
	Aquæ,	.	.	.	.	.	.	ad ʒ viij.

Or,

R	Potassii permanganat.,	.	.	.	.	.	.	ʒ i.
	Aquæ,	.	.	.	.	.	.	ad ʒ viij.

An exceedingly nice way of using a lotion is by means of the hand-ball atomizer, shown in Fig. 47. Schuster<sup>1</sup> advises that these ulcers should be thoroughly scraped out by means of the sharp spoon, or else cauterized by means of nitrate of silver. I doubt the propriety of resorting to any destructive measures in the treatment

<sup>1</sup> Loc. cit.



of this lesion, in that the excessive loss of tissue from the ulcerative action is the essential condition which we desire to control. Much of the tissue is of course diseased, but a better result can be obtained by converting this into healthy tissue, rather than by its total ablation. This is accomplished by the local applications above indicated, together with the internal administration of the iodide of potassium. In this stage of the disease, much smaller doses are required than in the primary stage of gummatous infiltration, in that much of the gummatous material has been entirely destroyed, and but a small portion of it is left to be affected by remedies; hence, I think a larger than a twenty-grain dose of the iodides is rarely indicated. This should be administered until there is evidence that the disease is well under control, and that such ulcerative action as remains is due only to the existence of necrosed bone. There is no objection to the commencement of the administration of mercury in this stage of the disease, and this may be given in connection with the iodides, using either the bichloride or biniodide, in doses of one-sixteenth of a grain three times daily.

If the probe reveals the existence of necrosed bone beneath the ulcer, the indications are that this should be removed, for in many cases this undoubtedly keeps up the diseased action, by its mere presence, as of a foreign body. It is important, however, to distinguish between necrosed bone, and exposed bone, for in the latter case, the probe often gives indications which may very closely simulate those of necrosis, and yet the disease may not have gone so far but that it may be still amenable to prompt and efficient measures of treatment, under which its integrity may be completely restored. The impact of the probe upon necrosed bone gives rise to a hard, dry, gritty sensation, which is notably different from that of merely exposed bone, where there is a slight suggestion of softness, and moisture in connection with the gritty feeling. If the part is completely necrosed, and a loose sequestrum has formed, it is to be removed by means of a stout pair of forceps. If it is too large for removal, it should be broken up with a proper crushing instrument, or better still by the snare, the loop of which may easily be placed around it, when it can be crushed, or cut in halves.

If the sequestrum has not fully separated itself, I am disposed to think it is well to wait until this has taken place, for separation follows rapidly the necrotic process. Certainly I do not approve of the burr and dental engine which have been used so much of late in these cases, in that these devices accomplish their work entirely in the dark, and do not admit of that nice manipulation and ocular direction which should govern all our operations in the nasal cavity. I have seen no case of necrosis of the bones of the nasal

cavity in which a sufficiently accurate diagnosis of the size and locality of the sequestrum could not be made by means of the eye and the probe, as to render its removal comparatively simple, and that without that injury to neighboring parts which is so liable to occur from the use of the burr.

THE GENERAL OR CONSTITUTIONAL TREATMENT OF SYPHILIS. —After the local lesion has been satisfactorily disposed of, the further indication, and by far the most important one, is to eliminate the syphilitic poison from the system, by a prolonged course of mercurial treatment. I know of no special preparation of mercury which possesses any notable superiority in the accomplishment of the purpose. It has been my practice to administer the bichloride, in doses of one-sixteenth of a grain, three times daily, continuing this for three months. Its administration is then stopped for two weeks, when it is resumed in the same doses, and its administration continued thereafter for two months, followed by a period of rest for one week. At the end of eight months, the dose is reduced to one-twentieth of a grain, and this is to be continued until two years have elapsed, from the last appearance of the specific lesion, with weekly periods of rest at the end of each two months. It is understood that we administer mercury after the syphilitic lesions have disappeared, the indications for treatment of the specific lesions having already been fully considered. Keyes,<sup>1</sup> in laying down a specific plan of treatment of syphilis, places special emphasis on the tonic influence of this drug, substantiating his view by a series of exceedingly interesting experiments, wherein he demonstrated, that under the long continued administration of mercury in syphilis, the number of red blood-corpuscles increases, as shown by the hæmatometer. Hence, Keyes's plan of treatment is generally known as the "tonic" plan. His observations are undoubtedly correct, but I think there is reason to regard this increase of blood-corpuscles as the result of the general improvement of all the nutritive processes in the system, as the syphilitic virus becomes eliminated by the direct action of the mercury. This drug is simply a specific in syphilis. Its tonic effect is purely secondary. Keyes prefers the use of the protoiodide of mercury, which he gives in the form of granules, each containing one-sixth of a grain, in the following manner: "let him take one standard dose of mercurial (one granule of the protoiodide, for example) after each meal for two or three days. On the fourth day one extra standard dose is added at the mid-day meal. Now

<sup>1</sup> "The Effects of Small Doses of Mercury Modifying the Number of Red Blood-corpuscles in Syphilis." *Amer. Jour. of Med. Sciences*, January, 1876. Also "Internal Treatment of Syphilis," *Trans. Internat. Medical Congress*, Phila., 1877. Also, "Tonic Treatment of Syphilis," *N. Y.*, 1877. Also "The Venereal Diseases," *N. Y.*, 1880.

four standard doses (granules) are taken daily and this is to be continued for three days when a fifth is added. On the succeeding fourth day another standard dose is added, two standard doses being now taken after each meal — six granules a day." In this manner, the dose is increased every third or fourth day, until slight symptoms of salivation are manifested, when it is reduced one-half, and kept at this point permanently, unless symptoms reappear, when it is gradually increased again, the idea being to find just exactly the amount of mercury that will absolutely control any manifestations of the disease. This plan of Keyes's is certainly a most excellent one, and yet as regards syphilis of the upper air-passages, I regard even slight salivation as a condition always to be avoided with the greatest care, as not only subjecting the patient to great annoyance, but as directly exercising a depressing influence upon the general system.

Of course, it is to be understood that, in dealing with the deep ulcer, followed by necrosis, the administration of mercury is not to be postponed until all the nasal symptoms disappear, for really with the breaking down of the gummy tumor in syphilis of the nose, the syphilitic lesion, viz., the gummatous infiltration, to a large extent disappears, and the long-continued ulcerative process which it leaves behind is largely due to the presence of necrosed bone, and persists until the sequestrum separates and has been discharged or removed. That the mercurial treatment is not to be regarded as really a tonic treatment, is shown by the fact, that in many cases, where there is notable impairment of general health, it becomes absolutely necessary to administer barks and iron, or cod-liver oil, in order to improve general nutrition. The indications for these remedies are always very clear, and their administration governed by ordinary rules. The main obstacle to the administration of mercury lies in the intestinal irritation which it very frequently produces, in the form of griping pains and loose, watery stools. I believe that the bichloride is freer from this objection than any other form of mercury, and for this reason I give it preference, although in many cases it will be found that no form of mercury is free from this effect. Our main reliance in these cases would be in the administration of small doses of opium, in connection with the mercury. For this purpose, it is well to order pills containing one-quarter of a grain of the extract of opium, and administer one of these with each evening dose, and if necessary successively add it to the noon and morning doses. If this is not sufficient, a second opium pill can be added to the evening dose, and so on, until the intestinal irritation is controlled. It is an excellent suggestion of Keyes's in these cases, to administer blue mass in doses of half a grain, in



combination with quarter of a grain of dried sulphate of iron. In spite of all changes in the form of mercury, and the administration of correctives, it will oftentimes be necessary to abandon, for a time, its internal exhibition, and resort to inunctions or fumigations. Inunction is not a nice way to administer mercury, but it is certainly very efficient. For this purpose, preference should always be given to the oleates, as being less objectionable than mercurial ointment. We may order from twenty to thirty minims of a twenty-per-cent oleate, rubbed on the thighs or forearms daily. Fumigation is usually resorted to, as a rapid method of bringing the system under the influence of mercury, and yet I have occasionally ordered a mercurial bath, of from seventy to one hundred grains of the sulphuret of mercury, twice or three times weekly, as a substitute for the internal administration of the drug, with most excellent results, continuing its use for several weeks at a time, until the intestinal irritation, which was caused by its internal administration, subsided.

In case any of the above nasal lesions of syphilis appear during the mercurial course of treatment, they of course will necessitate a resumption of the plan of treatment already laid down. The time during which the mercury should be administered, must in all cases, I think, be extended fully to the end of two years from the date of the last serious lesion. Few cases, nowadays, of the late lesions of syphilis appear, without the patient having previously been subjected to treatment, but that this previous course of treatment has been inefficient, I take it, the reappearance of the disease is sufficient evidence. Hence, I think, we must act on the ground that all previous treatment has been of no effect. Whether this be true or no, I certainly am of the opinion, that it is our duty to subject the patients to a thorough course of antisymphilitic treatment, viz., mercurial, for the full length of two years after the last unmistakable lesion.

## CHAPTER XXIV.

### CONGENITAL SYPHILIS OF THE NASAL PASSAGES.

SYPHILIS in the father or mother is exceedingly liable to be followed by syphilis in their offspring. Whether a syphilitic father can transmit syphilis to the offspring without infecting the mother, or whether the mother must first be infected, and thereby transmit the disease to the child, is still a matter of discussion among syphilologists. Again, it is still an open question as to how long, after the primary lesion, the father or mother can transmit the disease. The weight of opinion, however, I think, leans decidedly to the view that the limit of transmission in either the father or the mother is certainly within three years after the contraction of the disease. These problems, however interesting, need not be discussed in the present chapter.

As a result of inherited syphilis, the *fœtus* in utero may become syphilitic, giving rise to premature birth, or the child may be still-born at the end of the full term; or, again, the manifestation of the disease may be delayed until after birth, although, if the disease is present, it shows itself very soon. Thus Von Rosen<sup>1</sup> found that, out of sixty-eight cases, in all but nine the disease manifested itself earlier than three months after birth; while Kassowitz,<sup>2</sup> out of one hundred and twenty-four cases of hereditary syphilis, found symptoms presenting in eleven cases in the first week, twenty-one in the second, thirty-four in the third and fourth, forty in the second month, and eighteen in the third month; while Roger,<sup>3</sup> out of two hundred and seventy-two cases of hereditary syphilis, found that the symptoms presented in one hundred and twenty-two cases in the first month, one hundred and twenty-eight cases in the second and third, and only thirty-two later. Bäumler<sup>4</sup> comes to much the same conclusion, in making the general statement, that nearly half the children are attacked in the first month of life, one-third in the second, about one-eighth in the third, and only one-eleventh at a later period, although he adds, however, that the symptoms very

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<sup>1</sup> Behrend's "Syphilidologie," new series, iii., 1861, pp. 223, 226.

<sup>2</sup> "Die Vererbung der Syphilis," Vienna, 1876.

<sup>3</sup> "Recherches cliniques sur les maladies de l'enfance," vol. ii., 1883, p. 1.

<sup>4</sup> Ziemssen's "Cyclopædia," vol. iii., p. 240.

seldom begin in the first week, and not infrequently in the second; while Diday<sup>1</sup> makes the statement, that he has seen a few cases as late as four months, and one case, in which the disease did not appear until the child was nearly two years old. This last statement is somewhat unique, and it is not improbable that this child may have acquired the disease after birth, as it scarcely harmonizes with our knowledge of the action of syphilitic virus, that it should remain latent for two years in the nursling.

The present consideration is confined entirely to the discussion of hereditary syphilis, which is occasionally treated of under the designation of congenital syphilis. Now, the latter term may be used to describe a form of syphilis which is acquired at birth, namely, by infection from an existing lesion in the genital passages of the mother. In this case, I am disposed to think that the disease runs an entirely different course from that to be described in the present chapter, probably differing in no very marked degree from the ordinary type of acquired syphilis, although these cases are so exceedingly rare, that the data upon which any general statement is based, must necessarily be, to a certain extent, limited; hence, when Simon<sup>2</sup> makes the statement that "Congenital syphilis not infrequently manifests itself for the first time after weeks, months, or, in certain instances, not until the age of puberty, and even after many years," I think if, by congenital syphilis, he means the hereditary form of the disease, the statement must be accepted with considerable reservation. If, however, he alludes to syphilis acquired at birth, his assertion may undoubtedly be correct, with reference to the very late manifestation of the disease, although even here, there is an element of doubt, in that syphilis can be acquired in irregular or accidental ways, and the primary lesion escape observation; for, in cases where the disease is acquired at birth, we should usually expect a more rapid course of development than in adult life, although by no means so rapid a course as is met with in the hereditary form of the disease.

The earliest manifestation of congenital syphilis in children is either in a coryza or in some form of cutaneous eruption. In still rarer cases, we have iritis, deafness, or some obscure brain symptoms. I know of no statistics bearing on the frequency of the special lesion, although, unquestionably, in the large majority of cases, the first manifestation of syphilis in children occurs in the form of a coryza, which, manifesting itself by the ordinary symptoms of nasal stenosis with watery discharge, as the disease progresses, gradually develops into a muco-purulent discharge of a somewhat acrid char-

<sup>1</sup> "Traité de la syphilis des nouveaux-nés et des enfants à la mamelle," Paris, 1854.

<sup>2</sup> Virchow's "Spec. Path. u. Therapie," art. Syphilis, Band ii., Abth. 2, p. 577.



acter, giving rise to irritation of the muco-cutaneous junction and of the upper lip, together with crust formation about the margins of the nostrils. The essential lesion consists of an inflammation of the mucous membrane lining the nose, apparently a non-specific rhinitis. We probably have no means of making a definite diagnosis in these cases, in that the examination of the nasal cavity is not only exceedingly difficult in young children, as revealing any easily recognizable condition, but, moreover, if an examination were feasible, it is questionable if the morbid appearances would afford any special light in directing attention to the existence of syphilis. The diagnosis must depend in part on the clinical history of the case, and the concomitant appearances, but mainly on the general appearance of the child, who shows very marked evidence of malnutrition, the skin presenting a pale, somewhat earthy color, while the general facial expression gives to the child a somewhat pinched and old-man face, as it were. In connection with this, in the majority of cases, either concomitant with the development of the nasal symptoms, or soon after, there appears the ordinary eruption on the skin, which verifies the diagnosis. This makes its appearance usually about the anus or buttocks, and afterward spreads over the body. This is usually papular in character, presenting the typical copper color. The further manifestation of the disease in the nose consists in the deposit of gummatous material, either in the superficial or deep layers of the membrane, which, breaking down rapidly, results in an ulcerative process. This phase of the disease is manifested by an increase of the pus discharge, which has now assumed a somewhat offensive character, and is mingled with blood and shreds of black necrotic tissue. The secretions from the ulcerative surfaces form hard incrustations, which drying, by a somewhat rapid process of accretion, obtain such size as that they cannot be expelled from the cavity, and hence form an additional source of irritation, in that they may give rise to reflex brain disturbances, which may lead to the suspicion of the existence of some form of brain-syphilis. In most cases, probably, however, this is due simply to the fact that the incrustations accumulate to such an extent as to completely block the passages, and prevent the escape of the purulent discharge. Herman Weber<sup>1</sup> has reported two cases of infantile syphilis, in which epileptiform convulsions, followed by coma, developed coincidently with the cessation of the sanious discharge from the nose, the nervous symptoms disappearing, however, immediately upon the reestablishment of the escape of pus from the nose. A fair inference might be here, that the damming back of the pus might have given rise to septic infec-

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<sup>1</sup> Med. Chir. Trans., vol. xliii., p. 188.

tion, but septicæmia is one of the rarest of complications in nasal syphilis, even where extensive necrosis has resulted from the disease. A true explanation of the development of the brain symptoms in these cases is to be found in the fact, that in young children the retention of the crusts produces reflex disturbances of the nerve-centres.

Congenital syphilis of the nose in young children runs an exceedingly rapid course, the ulceration following rapidly on the coryza, which very soon leads to exposure of bone, and subsequent necrosis, as external deformity shows itself very early in the history of the case, evidencing the fact that the whole of the bony septum, and probably some portion of the nasal bones, have been destroyed. In a case reported by Hawkins,<sup>1</sup> nasal syphilis developed in a child six weeks after birth, resulting in complete destruction of the vomer, with sinking in of the nose four months later. We thus find the clinical history of the development of syphilis in children, differing from that of adults in a very striking degree. This is not to be explained by the view, that inherited syphilis is a more active poison than the acquired form of the disease, but rather to the fact, that small children possess a comparatively slight power of resisting the inroads of any disease: hence, the syphilitic virus makes a very powerful impression from the onset upon infants, giving rise to a general impairment of all the nutritive powers, as evidenced by their general cachexia already described, this general cachexia not being necessarily a direct, but an indirect result of the disease.

DIAGNOSIS.—The diagnosis of nasal syphilis ought to be comparatively easy in all cases, in the early stage, where it is characterized by a simple coryza. It should be remembered that the turbinated tissues are in a very early stage of development at birth and for some months later, hence an acute idiopathic rhinitis is an exceedingly rare disease at this age. Furthermore, if by any chance such a disease exists, it would run the ordinary course of a few days, and undergo resolution, whereas in syphilis it progresses rapidly toward the development of a discharge, of such a decidedly purulent character as to eliminate the possibility of its being an acute rhinitis even in its late stages, wherein the discharge never obtains an absolutely purulent character. In a purulent rhinitis in children, in the early stage of atrophy, the disease never develops earlier than from three to four years of age, and in its earlier stages, is an exceedingly mild affection, and not characterized by any notable stenosis, or great swelling of the mucous membrane. Hence in a given case of coryza, in the first few months of life, suspicion

<sup>1</sup> "Contributions to Path. and Surgery," vol. i., p. 229.

should always be excited of the existence of inherited disease. If, in addition, the child is small, illy-nourished, and presents the ordinary appearance of anæmia, together with an earthy tint of the skin, and old-man look in the face, we have still further confirmation of this suspicion. The appearance of the characteristic eruption, however, renders the diagnosis complete, and this should be easily recognized from its gross appearances. According to Bäumlér,<sup>1</sup> this usually presents in the typical copper-colored elevated papules, present on the buttocks or about the anus, which very soon assume the appearances of mucous patches. In still rarer cases, the eruption may be of the macular character, although Romberg<sup>2</sup> and Van Harlingen<sup>3</sup> assert that the smooth macular eruption is the more frequent. In either case, however, of course, the minute extravasations are characteristic of syphilis, as shown by the copper-colored tint of the eruption. Still later developments, as bloody pus mixed with necrotic tissue, in connection with the characteristic fetor which attends an ulcerative process in the nose, of course, leave no possibility of mistake in diagnosis. Bäumlér<sup>4</sup> alludes to the characteristic appearance of the external nose, in these cases, which consists mainly in a depression or flattening of the nasal bridge, together with a protrusion of the frontal sinuses. This feature is oftentimes noticeable, and is not to be regarded as an evidence of any distortion of the nasal bones as the result of disease, but is rather due to the fact, that in consequence of the stenosis, the alæ of the nose are sunken in, and the nostrils to a certain degree collapsed, as a result of which, the bridge of the nose presents a somewhat bulbous or swollen appearance, which is heightened by the emaciation of the child, the features being pinched, as it were, and the subcutaneous cellular tissue being absorbed, and the thin flabby skin drawn firmly, as it were, across the nose, giving it a misshapen aspect which, as before stated, is only an appearance, and not an absolute condition.

In addition to these objective symptoms, much light can also be thrown on the matter of diagnosis, by making close inquiry as to the possibility of syphilitic disease in either the father or mother. A patient may oftentimes attempt to deceive a physician, where the inquiry is made in regard to acquired syphilis in his own person. When, however, a man is confronted with the possibility of having transmitted a terrible disease to his offspring, he is usually disposed to answer questions with absolute candor and honesty. Hence,

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<sup>1</sup> Loc. cit., p. 238.

<sup>2</sup> "Klin. Ergebnisse," Berlin, 1846, s., 178.

<sup>3</sup> "International Cyclopedia of Surgery," vol. ii., p. 453.

<sup>4</sup> Loc. cit., p. 239.



this clinical feature of the disease can usually be investigated very thoroughly, and the facts of the case established with a fair degree of certainty. The same considerations, I take it, apply with equal force to the mother, who in a matter of this kind, will confide the truth to the physician, even if she have something to conceal from her husband. As a matter of clinical observation, any father or mother who has had a primary syphilitic lesion within three years preceding conception, is liable to transmit that disease to the offspring. Whether this possibility of transmission occurs later, is still an open question. Clinical facts, however, I think are rather against it, and hence our investigations should be made on this basis. Still another interesting question is as to the possibility of the father transmitting syphilis to his child, without first infecting the mother. Clinical facts are about equally distributed in supporting one or the other side of this question, and yet, on purely physiological grounds, it is not easy to understand why this may not be; especially as the possibility of inheriting the rheumatic, gouty or tubercular diathesis from the father remains unquestioned.

PROGNOSIS.—The early development of syphilis in children is to be regarded as an evidence of the activity of the specific virus in the system. Thus, in a case where the evidences of the disease are presented at birth, the prognosis is simply bad, as those cases are rarely amenable to treatment—one of the most serious features of the case being, that the nasal disorder so far interferes with nursing, as to lead to the very early development of mal-nutrition or marasmus, and the children usually succumb, largely as a result of this complication. On the other hand, we may state it as a rule, that the later the development of the disease, the more favorable the prognosis, in that the child has had an opportunity of gaining vigor and strength to combat the blood poison when it manifests itself, and furthermore, I think it may be stated as a rule, that the later the disease manifests itself, the slower its progress, hence the better the opportunity for establishing the diagnosis, and placing the child under proper remedial measures. In the ordinary run of cases, namely, in those cases in which the coryza of syphilis sets in from four to six weeks after birth, the prognosis is based largely on the general condition of the child, many children showing at this age very marked evidence of marasmus. In these cases, the prognosis is bad. If, on the other hand, we have to do with a fairly well-nourished child, at four to six weeks of age, who develops syphilitic coryza, when we consider the fact that we possess a specific remedy in mercury, and that children come readily under the influence of this drug, the prognosis may be considered favorable, if the disease is recognized, and the remedies administered. If ul-

ceration, with resultant necrosis, has developed before the disease is recognized, this does not in itself modify the prognosis as regards ultimate recovery, other things being equal. In other words, if a syphilitic child has developed necrosis at six months without treatment, and still shows no very marked evidence of general malnutrition, there is no reason for giving an unfavorable prognosis, in that the syphilitic explosion, as it were, which leads to the deposit of gummatous material in the mucous membrane lining the nose, seems to have exhausted itself in this deposit, and the further progress of the disease is largely a local process, in that the mass breaks down into an open ulcer, under which all the gummy material which formed the original deposit is thrown off. The necrosis of bone which results, entails a much longer process for its exfoliation. This process, however, does not necessarily lead to any impairment of the general health, except so far as it interferes with the normal function of the nose—interfering with nursing, and thereby producing impaired nutrition. If what has now become a local disease, acts to impair the general health, it acts indirectly and not directly. As we have already seen, syphilitic disease of the nose in children, runs an exceedingly rapid course, but still adheres to the same rules which govern the manifestations of syphilis in the adult. It shows a marked hesitancy in transgressing anatomical boundaries, and does not extend, therefore, to the integument anteriorly, nor into the pharynx behind. If it produces destruction of the hard palate, it is due to an original deposit of gummy material in the bones forming this structure, or if the ethmoid or sphenoid bones are involved, this involvement is due to original syphilitic disease. In those cases, of course, where the extent of involvement of tissue in a necrotic process is very great, the prognosis must necessarily be, to a certain extent, rendered more grave, in that the general health must suffer in a young child, with so large an extent of diseased tissue. We come then to the conclusion, that a fairly correct prognosis can be made at the time the disease is recognized, and is based on the time at which the disease develops, the extent of tissue involved, and lastly, but of most importance, on the general condition of the child.

TREATMENT.—The local treatment of the coryza is a matter of some importance, if thereby we are enabled to restore the passages to their normal patency, and thus allow the child to take its nourishment in proper amounts, from the breast. For this purpose we, perhaps, possess no remedy which is as efficacious as cocaine, which should be used in the form of a spray, in about half-per-cent solution, as follows:

℞ Cocainæ hydrochloratis, . . . . grs. iij.  
 Sodii biborat., . . . . grs. vi.  
 Aquæ, . . . . ad ʒ i.

Or perhaps better still, in the form of an emulsion with some oily substance, such as the following:

℞ Cocainæ hydrochloratis, . . . . grs. iij.  
 Aquæ, . . . . ℥ x.

M. ft. sol. et adde  
 Ol. menth. pip., . . . . ℥ v.  
 Ol. amygdalæ, . . . . ʒ i.

M. S. Shake well before using.

Either of the above can be used in the hand-ball atomizer, shown in Fig. 47 and placed in the hands of the attendant, to be applied to each nostril, every two or three hours. Astringents possess no value in this condition. The integument about the margins of the nostrils is always exceedingly tender, and should therefore be protected by the local application of vaseline or cold cream. A certain amount of good is undoubtedly done in these cases, by anointing the external nose either with mutton tallow, or better still, the well-known domestic remedy, the tallow of a goose. After the disease has progressed to the ulcerative stage, our efforts are directed entirely toward keeping the parts thoroughly cleansed by means of a wash, after the membrane has been reduced, and the passages opened as far as possible by one of the cocaine sprays already alluded to. For the purpose of the wash, any simple alkaline lotion may be used. The difficulty, of course, in cleansing the nose in an infant, is that the child cannot blow its own nose. This is fairly well accomplished for the child, by simply fitting the nozzle of the spray apparatus into the nostril, and blowing, the reservoir of the spray being empty, the theory being, that if you blow into one nostril of the child, the palate is immediately thrown up against the posterior wall of the pharynx, and that orifice closed. Hence, the current of air blown into one nostril escapes with considerable force through the other, carrying with it such mucus or pus as may lie in the cavity. If this is not successful, there is no serious objection to using a cotton pledget, firmly fixed on the end of a probe, as after the use of cocaine, the parts are by no means sensitive. If ulceration has set in, the efforts should be toward controlling this, in that the disease runs an exceedingly rapid course, and bony necrosis must necessarily occur, unless the ulcerative process is arrested, for we are justified in believing that a gummy deposit does not always extend deeply into the mucous membrane, and hence bony necrosis is not always an inevitable



result of an ulcerative action. Our best method of controlling ulcerative action is by the use of iodoform.

This should be applied, after the parts are thoroughly cleansed, by insufflation in the form of a powder. Neither of these drugs is irritating, and hence they can be used in full strength. By far the most important treatment of nasal syphilis, is to bring the child as rapidly as possible under the influence of mercury, the administration of which must be regulated by much the same rules as govern its administration in adults. If, for any reason, the administration by the mouth cannot be well managed, inunctions answer an excellent purpose, the amount to be used of mercurial ointment being about five grains daily, or else the oleate is used, two or three minims daily, of a twenty-per-cent strength. Ordinarily, however, I think its internal administration is preferable, and for this purpose we may use either mercury with chalk, or calomel, in doses of one grain twice or three times daily, or the protoiodide in doses of one-eighth or one-tenth of a grain. In children, as in adults, the administration of iodine is liable to cause disturbance of the bowels. This, however, can be regulated by the administration of a small quantity of opium, or it may necessitate the abandonment of internal medication, and compel us to resort to inunctions, or mercurial baths. The mercurial bath may be prepared, by dissolving eight or ten grains of corrosive sublimate, in four or five gallons of tepid water, into which the child is placed, and allowed to remain from ten to fifteen minutes, care being taken to exclude water from the eyes, mouth, and nose. If ulceration exists in the nasal cavity, or evidence of gummy deposit, it is well to administer small doses of iodide of potassium, for a limited period of time, its duration being governed by the toleration of the child, and the impression which the remedy makes upon this special feature of the disease. The dose, however, cannot ordinarily well be increased above possibly two grains, given three times daily. This, however, must be given in connection with some form of mercury; in this case, it is probably wiser to confine the administration of mercury to either the biniodide or bichloride, as in this manner any danger is avoided of forming a poisonous combination in the system, of the iodine with mercury, although this objection to the combined administration of these two remedies has probably been overestimated. In addition to the constitutional treatment, the general condition of the patient ordinarily demands the administration of tonics, and especially the use of cod-liver oil, while, at the same time, the most scrupulous care must be exercised, in the observation of the utmost cleanliness in the child's surroundings, the daily administration of the cold bath, and by subjecting the child to the best of general hygienic influences.

## CHAPTER XXV.

### TUBERCULOSIS OF THE NASAL PASSAGES.

TUBERCULOUS disease invades the nasal passages with greater rarity than any other portion of the respiratory tract. Thus Willigk,<sup>1</sup> in four hundred and seventy-six autopsies of tuberculous cases, found but one case in which the nasal membrane was involved, while Weichselbaum<sup>2</sup> found two cases in one hundred and sixty-four autopsies. If the theory that tuberculosis is a germ disease, and therefore infectious, has any foundation in fact, we can easily understand how the nasal mucous membrane should fail to afford a lodgment for the floating germ, in that any particle lodging upon its surface, would be washed away by the constant flow of serum in the process of respiration. The same is true, not only of tuberculosis, but of all the infectious diseases, the germs of which, as we know, find a more favorable lodgment in the fauces. The first to recognize the disease during life was Laveran<sup>3</sup> who reported two cases, in which advanced tuberculosis was complicated by a low form of sluggish ulceration upon the septum, which Laveran considered as due to a tubercular deposit. In one of these cases, the diagnosis was confirmed by autopsy, while in his second case, there was some question whether the disease was genuinely tuberculous in character.

In a rather curious case reported by Riedel,<sup>4</sup> the ulceration on the nasal septum persisted for twenty-seven years, and while the lungs were entirely healthy, a microscopical examination of tissue removed from the affected surface, revealed the existence of tubercular disease, as occurred also in a second case reported by Riedel,<sup>5</sup> where an ulcerative process on the septum, of one and a half year's duration, was shown on microscopical examination to be due to tuberculosis. In this case also, the lungs were declared to be healthy. Spillman,<sup>6</sup> in reporting a case, gives an exceedingly

<sup>1</sup> "Sections-Ergebnisse an der Prager. Path. Anat. Anstalt von 1. Feb. 1850 to 1. Feb. 1852." Prag. Vierteljahresschrift, vol. xxxviii., p. 4.

<sup>2</sup> Allg. Wien. Med. Ztg., 1881, xxvi., 268.

<sup>3</sup> Union Médicale, 1877, No. 36, p. 501.

<sup>4</sup> Deut. Zeit. für Chir., Leip., 1878, vol. x., pp. 56-58.

<sup>5</sup> Loc. cit.

<sup>6</sup> As quoted by Cartaz, La France Médicale, 1887, No. 85, p. 1,020.

graphic description of the characteristic appearances of the tubercular ulcer, as involving the lower portion of the nasal septum, in a patient suffering from pulmonary phthisis, with tubercular ulceration of the nose, although the diagnosis was not confirmed in this case by autopsy. A case reported by Tornwaldt<sup>1</sup> is interesting, in that it is the first record of the disease as invading the mucous membrane covering the turbinated bodies. In this case, the disease manifested itself in the form of a small raspberry-shaped excrescence, about the size of a pea, at the anterior termination of the lower turbinated body. A smaller mass was also found in the upper surface of the soft palate, while there were granular erosions on the septum. In reporting two additional cases, Weichselbaum<sup>2</sup> enters into a somewhat elaborate discussion of the whole subject of nasal tuberculosis, mainly from a pathological point of view. In his first case, a boy of fifteen, suffering from general tuberculosis, there was on either side of the septum a number of small grayish-yellow ulcers, which an autopsy revealed to be tubercular in character. In his second case, the disease developed in the form of small gray ulcers on the lower and middle turbinated bodies of one side, while on the other, there was a small tubercular mass on the middle turbinated, just commencing to take on ulcerative action. This diagnosis was also confirmed by autopsy. Miliard,<sup>3</sup> in a case of acute miliary pharyngeal tuberculosis, found tubercular nodules, as large as a millet seed, in the nasal mucous membrane. In a case reported by Riehl,<sup>4</sup> tubercular disease, involving the integument covering the nostril, nose and lip, seems to have extended to the nasal septum, resulting in infiltration, with ulceration of both surfaces. The diagnosis was confirmed in this case by autopsy, which also showed advanced disease of the lungs. Demme<sup>5</sup> reports two cases in children. The first case was that of a child, one year of age, whose nose was stopped with brownish crusts. When these had been removed, there were found, on the septum, the characteristic nodules and ulcers of tubercular disease. The base of the ulcers appeared dirty yellow, and they were covered with thin yellowish pus. There was no history of congenital syphilis. The child died later, of pulmonary tuberculosis.

His second case occurred in a child, aged eight months, with no specific or tubercular family history. The child, however, was cared for by a family in which the father died of tuberculosis. At

<sup>1</sup> "Ein Fall von Tuberculose der Nasenschleimhaut." *Deut. Arch. f. Klin. Med., Leip.*, 1880, xxvii., 586-591.

<sup>2</sup> *Loc. cit.*

<sup>3</sup> *Bull. de la Soc. Méd. des Hôp.*, 1881.

<sup>4</sup> *Wien. Med. Woch.*, 1881, No. 4., p. 1261.

<sup>5</sup> *Berlin. Klin. Woch.*, 1883, No. 15 p. 217.



the age of six months, and two months after entering this family, the child began to suffer from a foul-smelling nasal discharge. An examination of the right nasal cavity revealed the characteristic tubercular nodules and ulcers on the septum. Tubercular bacilli were found in the discharge from the nostril. The child died later, of tubercular meningitis. The case is especially interesting, from the fact that the author favors the opinion that the child became infected from living in a tubercular family.

Berthold,<sup>1</sup> in reporting an instance of the disease, has failed to give the history of his case sufficiently in detail to make it of any interest. Cartaz<sup>2</sup> cites the case of Sokolowski, in which the ulceration on the septum showed a tendency to extend to the upper lip, and, furthermore, was exceedingly painful. This diagnosis was based on the discovery of the tubercular bacillus in the secretions. Schäffer's<sup>3</sup> experience certainly has been somewhat unique, in that out of four hundred and fifty cases of tumors of the nose, he has met with eight cases of tubercular disease, six of which he has reported somewhat in detail. In all of these, the disease assumed a neoplastic form, and as a rule, was located upon the septum. In four of his cases, the diagnosis was based on gross inspection, there being no microscopical examination made, and furthermore, in three of these, the lungs were perfectly healthy. In the fifth and sixth cases, the condition of the lungs is not given, although the character of the ulcerations was determined by the microscope, which revealed the presence of bacilli and also the characteristic tubercular tissue. Cartaz,<sup>4</sup> in reporting a case, enters into quite an elaborate discussion of the whole subject of tuberculosis in the nose, and gives an analysis of all cases reported up to date. In Cartaz's case, a large rounded tubercular ulcer made its appearance on the septum, the patient suffering from advanced phthisis. A case of nasal tuberculosis was presented by Juffinger,<sup>5</sup> a detailed account of which is not given.

Hajak<sup>6</sup> presented a case of the same disease, before the same society, the details of which are as follows:

A male, æt. thirty, presented with the history of a bloody discharge from the right nostril, the source of which was found to be ulcer on the cartilaginous septum. Potassium iodide was administered without benefit. At a later examination, a growth was

<sup>1</sup> Berlin Klin. Wochenschr., 1884, No. 40, p. 644.

<sup>2</sup> Loc. cit.

<sup>3</sup> Deut. Med. Woch., 1887, vol. xiii., pp. 308-310.

<sup>4</sup> La France Médicale, Nos. 84, 85, 86 & 87, 1887.

<sup>5</sup> In der Sitzung der Gesellschaft der Aerzte in Wien vom 30. Nov. 1888. Wien. Klin. Wochenschr., 1888, No. 36, p. 748.

<sup>6</sup> Ibid.

discovered in the naso-pharynx. After the removal of the growth, it was found that its surface was ulcerated, and a microscopical examination revealed tubercle bacilli. A fragment was now removed from the septal ulcer, and bacilli were found in the deeper parts. The treatment consisted in scraping the ulcer, and the subsequent application of lactic acid. The benefit was only temporary, recurrence always following at the end of a few weeks, and finally the disease invaded the opposite side. The termination of the case is not given.

Kikuzi<sup>1</sup> reports a case, under the care of Bruns, at the Tübingen Clinic, in a male thirty years of age, in whom there was no hereditary history of tuberculosis. At the time of examination, there was no evidence of tubercular disease of any of the internal organs, syphilis, or lupus. The disease had produced perforation of the cartilaginous septum, and assuming the neoplastic form, had caused complete stenosis of the right nostril, and narrowing of the left. An external operation was done and the disease eradicated. Five months after, there was a partial recurrence, which was treated with the curette and galvano-cautery. The tubercular nature of the disease was confirmed by microscopic examination.

Luc<sup>2</sup> reports the case of a male, suffering from a profuse mucopurulent discharge from the right nostril, and pain on deglutition, confined to the left side of the throat. Examination revealed a small ulceration, behind the left pillar of the fauces, which was proven to be tubercular. In the right nasal fossa, a similar ulceration was found on the inferior turbinated bone. There were evidences of infiltration at the left apex, and of tubercular orchitis.

Both ulcerations were scraped with the curette, and cauterized with the galvano-cautery. The ultimate result was good. Tennesson<sup>3</sup> reports a case of ulceration in the nasal cavity, which was probably tubercular in its origin. The ulcer had lasted four months; its borders being soft and injected. There was consolidation at the apex of the right lung, together with diarrhoea, and albuminuria.

We find then twenty-seven cases of nasal tuberculosis reported in literature. A review of these cases, however, I think warrants us in excluding a certain number of them, in that the diagnosis is not sufficiently established. In Weichselbaum's very elaborate study of the disease, he excludes one of Laveran's cases as unproven, while he also questions Riedel's cases, in which, while the microscope seemed to indicate the existence of tuberculosis, we have the disease in his first case lasting twenty-seven years, in a man enjoy-

<sup>1</sup> "Beiträge zur Klinischen Chir." Tübingen, 1888, Bd. iii., Heft 3, p. 423.

<sup>2</sup> Archiv. de laryng., février, 1889, No. I, p. 19.

<sup>3</sup> Ann. de Dermat. et de Syph., March 25th, 1889, p. 214.

ing perfect health, and again in Schäffer's four cases, which were based entirely on ocular inspection, I think we are justified in seeking a better confirmation of the diagnosis. We thus have left, twenty cases, on which, I think, our knowledge of the clinical history of the disease must be based.

ETIOLOGY.—The disease occurs either in connection with pulmonary or general tuberculosis, exceptions to this rule being the two cases of Riedel's in which the diagnosis is doubtful, and a single case of Schäffer's in which no pulmonary disease was recognized. Hereditary influence is shown to exist in a large proportion of cases of the disease. How far the local condition of the nasal cavity may affect the ulcerative process cannot be determined, although, undoubtedly, it has some influence in that direction. Aside from this, we recognize no conditions which stand in a causative relation to nasal tuberculosis, other than those which we recognize in connection with the same morbid process as affecting other regions of the body.

PATHOLOGY.—A tubercular process in the nasal mucous membrane manifests itself in two forms. In the one case, it develops in the ordinary tubercular ulceration, very similar to that observed in other portions of the air-tract. In other cases, it shows a tendency to hyperplasia, in the form of small tumors, varying in size from bird-shot to a pea, presenting a somewhat mammillated or raspberry-like surface, the growths being attached to the parts beneath by a broad base. The ulceration, in the majority of instances, shows itself on the septum or floor of the nares, while the neoplastic form, on the other hand, is more frequently found on the turbinated bodies, although occasionally found on the septum also. Examination will determine whether the form be neoplastic or ulcerative. A section of the growth exhibits a fine basement membrane of connective tissue, richly infiltrated with round nucleated cells (lymph cells), together with larger nucleated epithelial or endothelial cells, and sometimes, but not always, true giant cells. The normal gland structure of the membrane is more or less modified, the glands may appear normal, or they may be distorted by the pressure of the surrounding inflammatory products. The gland epithelium may degenerate, or it may simply be pushed off, as it were, by the infiltration of the tissues by the round cells. The tissue immediately about the ulcer or tumor, as the case may be, shows an abundant round-cell infiltration. By appropriate staining, tubercle bacilli may be found, but if so, they are usually present in rather small numbers.

SYMPTOMATOLOGY.—If the disease takes on the ulcerative form, the prominent symptom will be the discharge of grayish mucus,



more or less profuse, according to the extent and size of the ulceration. If the ulceration is on the septum, especially if near the nostril, crust formation will prove a source of annoyance to the patient. In these cases also, slight hemorrhage is liable to attend the dislodgment of the crusts. Pain is rarely present, either subjectively or as the result of pressure. In the neoplastic form of the disease, the prominent symptom attendant upon the presence of these small growths is obstruction with a moderate amount of secretion and occasional hemorrhage.

DIAGNOSIS.—A tubercular ulcer, wherever it may be, presents a certain characteristic appearance, which distinguishes it from any other form of ulcerative action. Its surface is of a whitish-gray color, flush with the surface of the mucous membrane surrounding it. In other words, there is no apparent loss of tissue. The outline of the ulcer is somewhat irregularly rounded, while the mucous membrane surrounding the ulcer presents no characteristic distinctive features, there is no discoloration or, in other words, there is no areola, the color of the ulcer merging into the color of the mucous membrane beyond, in a way that oftentimes obscures the exact boundary of the diseased process. The secretion from the surface of the ulcer is usually a whitish-gray mucus, mingled with a few epithelial cells, not however in sufficient numbers to render the secretion notably opaque. The tubercular ulcer rarely, if ever, secretes pus. These peculiar characteristics of this form of ulceration are somewhat changed in the nose, owing to the fact that the impurities of the inspired air tend to irritate the diseased process in this region, and furthermore they lodge upon, and discolor the ulcerated surfaces. Hence, we notice a slight tendency to bleeding, together with a certain amount of congestion of the blood-vessels.

The hyperplastic form presents, on inspection, small rounded projections from the mucous membrane of the nose; as a rule they are found on one of the turbinated bodies, and are of a reddish-gray tinge and mammillated contour, presenting very much the appearance of a papillomatous growth, differing, however, from a papilloma, in that they are usually much smaller, more flattened, and are of a more regularly rounded contour. Occasionally, when the surfaces of these growths take on ulcerative action, the appearance is that of the ordinary tubercular ulcer, already described.

PROGNOSIS.—Apparently, tubercular disease of the nose gives rise to no very marked symptoms, and, furthermore, does not seem to very greatly affect the prognosis of the general or pulmonary disease to which it is secondary. I think, as a rule, that the nearer a tubercular process involving the air passages approaches to the external world, the more virulent and hopeless the disease seems

to be. Thus the fatality of pulmonary, laryngeal, pharyngeal, palatal and lingual tuberculosis, seems to show an increasing ratio of gravity in the order given. This is not true of the nasal disease. Here the ulceration is perfectly protected by bony walls, and is subjected to no disturbance or motion, as is the fact in the larynx and mouth, where it is subjected to continual irritation, by the movements of mastication, deglutition, etc. These ulcers show no marked tendency to extend in the nose, and indeed grow very slowly. As regards their curability, however, the prognosis is unfavorable. Local measures have accomplished little in the way of controlling the diseased process. The total extirpation of the disease seems to have arrested it in certain cases, although, as a rule, there has been a recurrence.

TREATMENT.—The indications for treatment, locally, consist in the use of cleansing and disinfecting washes, together with the local application of iodoform in powder. If pain be present, this should be combined with morphia. The neoplastic form demands extirpation by means of the snare or the curette, as suggested by Schäffer, after which the base is cauterized, either by a chemical agent or the galvano-cautery. That form of treatment which seems to have afforded the best results, is the total extirpation of the disease, where this is feasible, as is especially easy of accomplishment where the disease is located on the septum. Cartaz recommends the use of lactic acid after the method suggested by Krause in the treatment of laryngeal phthisis.

## CHAPTER XXVI.

### LUPUS OF THE NASAL PASSAGES.

LUPUS of the nose consists of a deposit in the tissues of the nasal mucous membrane, of what is probably a specific virus, which not only produces primarily certain local changes of an inflammatory character, and subsequently ulcerative action, but also leads, by a sort of migration of the virus, to the development of new centres of morbid activity in the neighboring tissues, giving rise to a crop, as it were, of what are generally termed lupus-nodules. The disease belongs essentially to the skin, and in the majority of instances, invasion of the nasal mucous membrane is due to the extension of the disease from the surrounding integument. In rare cases, however, the disease commences in the nasal cavity, and although not in every instance extending to the tissues beyond the muco-cutaneous junction, this tendency is usually clearly manifest. The disease has been the subject of an excellent monograph by Moinel,<sup>1</sup> while cases have been reported by Rigal,<sup>2</sup> Collis,<sup>3</sup> Reed,<sup>4</sup> Starke,<sup>5</sup> Shurley,<sup>6</sup> Kough,<sup>7</sup> Schmiegelow,<sup>8</sup> Van Santvoord,<sup>9</sup> Cozzolino,<sup>10</sup> Clutton,<sup>11</sup> Bresgen,<sup>12</sup> Rafin,<sup>13</sup> and Kikuzi,<sup>14</sup> the total number of cases here recorded amounting to twenty. Many of these, however, are given with insufficient data, while in others the diagnosis is open to serious question. Nevertheless, many valuable deductions can be drawn from an analysis of those cases in which the diagnosis has been established, and of which full reports have been given.

ETIOLOGY.—The origin of the disease is obscure, although it is

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<sup>1</sup> "Essai sur le lupus scrofuleux des fosses nasales," Paris, 1877.

<sup>2</sup> *Revue Médicale Française et Étrangère*, 1829, vol. iv., p. 401. Reported as a cancerous ulcer of the interior of the nose, but undoubtedly a case of lupus.

<sup>3</sup> *Dublin Quarterly Journal Med. Science*, 1866, vol. xlii., p. 324.

<sup>4</sup> *Canada Med. Journ.*, 1871, vol. vii., p. 154.

<sup>5</sup> *Ibid.*, 1872, vol. viii., p. 109.

<sup>6</sup> *Archives of Laryngology*, 1882, vol. iii., p. 307.

<sup>7</sup> *Lancet*, Feb. 10th, 1883, vol. i., p. 232.

<sup>8</sup> *Hospitals-tidende*, Marto, 1885.

<sup>9</sup> *New York Med. Journ.*, December 5th, 1885.

<sup>10</sup> *Archivio italiano di Laringologia*, vi., fasc. i., 1886.

<sup>11</sup> *Clinical Society's Transactions*, London, 1887, vol. xx., p. 264.

<sup>12</sup> *Deut. Med. Woch.*, No. 30, 1887, p. 663.

<sup>13</sup> *Lyon Médicale*, 1887, vol. lvi., p. 382.

<sup>14</sup> "Beiträge zur Klin. Chir.," Tübingen, 1888, Bd. iii., Heft 3, p. 427.



generally associated with a notably impaired condition of the general health, and in some instances, with unmistakable evidences of the strumous diathesis. It is usually said to occur more frequently in females than in males, although, in the above list of cases, about forty per cent of the sufferers were males. It is furthermore stated that it is essentially a disease of youth. This is not the rule, for although Kough's case was a child of six months, and Reed's, Van Santvoord's, Clutton's, and one of Shurley's cases occurred at the ages of from fourteen to sixteen, with these exceptions, the average age was thirty-six, the oldest case occurring at the age of fifty-two. Probably, in the majority of instances, the nasal affection is due to an extension from the external nose, which was the case in about forty per cent of those reported, but it should be borne in mind that undoubtedly a very large number of cases occur in which the skin affection so far overshadows the disease of the nasal cavity that no note is made of the latter, the notable cases being those in which the origin of the disease is the mucous membrane.

SYMPTOMATOLOGY.—A moderate amount of nasal stenosis, according to the extent of the disease, always attends its development, this symptom being aggravated by the marked disposition which the ulcerated membrane shows to the formation of crusts on its surface. This would seem to be a rather notable symptom of the disease, as specially noted by Kaposi,<sup>1</sup> these crusts having usually the character of broad, flat, brownish-colored scales. The forcible removal of these may be attended with slight bleeding, although this is never a prominent symptom of the disease. The discharge from the surface of the ulcer is of a thin sero-mucous character, and is never large in amount. Odor is rarely ever present, unless possibly where the disease is situated well up in the nasal cavity, and the crusts which cover the surface of the ulcer are retained for a sufficient length of time to undergo decomposition. While pain is not a prominent symptom of lupus of the skin, it may be present when the disease invades the nasal cavity, owing to the fact, probably, that the mucous membrane here is so much more sensitive to external impressions, although, even here, it never becomes a very distressing feature of the disease. According to Neisser,<sup>2</sup> a very frequent complication of lupus is erysipelas, in consequence of the ulcerated surface favoring the development of erysipelas cocci. Clinical observation, however, as regards nasal lupus, would scarcely favor this view.

<sup>1</sup> "Hebra on Diseases of the Skin," Sydenham Society Edition, London, 1875, vol. iv., p. 67.

<sup>2</sup> Ziemssen's "Handbook of Skin Diseases," American Edition, New York, 1885, p. 296.

**PATHOLOGY.**—The pathological changes which take place in the mucous membrane, consist essentially of a deposit in the tissues, or their infiltration with small, round corpuscles of granulation tissue, which imbed themselves between the bands of connective tissue and the glands, and show a tendency to follow the course of the blood-vessels. This infiltration, instead of occurring in a diffuse form, shows a marked disposition to gather itself into small masses, giving rise to the so-called lupus-nodules (see Fig. 102). An examination of these nodules, in many cases, will show the presence of giant cells. We have here, then, merely a number of independent centres of inflammatory action, which would seem to indicate that the disease is due to the entrance of this specific virus, as stated by Neisser,<sup>1</sup> each point of invasion becoming the seat of a localized

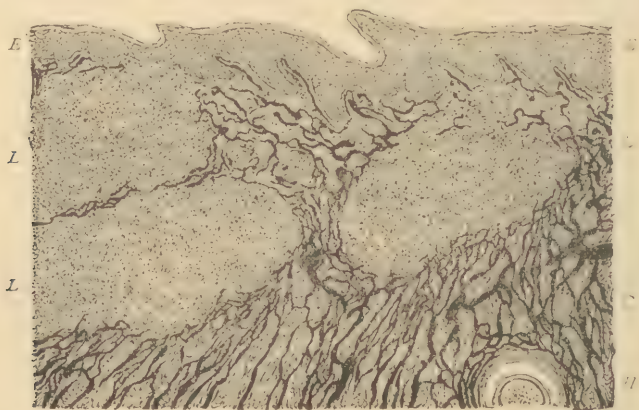


FIG. 102.—Lupus from the Inner Surface of the Ala of the Nose. *E*, Stratified epithelium; *L*, *L*, *L*, lupus nodules (avascular); *C*, fibrous connective tissue with injected blood-vessels; *H*, transverse section of hair.

inflammatory process. In addition, however, we notice the presence of giant corpuscles. These, as we know, may occur in tuberculosis, syphilis or scrofula, hence their pathological significance remains still a disputed question. The further changes which take place in the membrane, consist either in the re-absorption of the granulation tissue, or its progress toward the surface of the membrane, resulting in a breaking down of tissue there, and the establishment of an ulcerative process, which possesses somewhat peculiar characters, in that while the waste of tissue from the surface is by no means rapid, the building-up process, as it were, or the proliferation of round cells, continues; hence we have an ulcerative process, in which, instead of a loss of tissue, there is really an excess of tissue, the contour of the ulcer projecting above the normal surface of the

<sup>1</sup> Loc. cit.

mucous membrane. Schüller<sup>1</sup> has observed small, round bodies or micrococci, imbedded between the granulation cells, and extending in the form of irregular chains of micrococci, into the neighboring connective tissues. Neisser,<sup>2</sup> on the other hand, seems to think that Schüller is mistaken, and that the virus which causes the disease, will sooner or later be demonstrated to be the tubercular bacillus.

DIAGNOSIS.—In those cases in which the disease is due to an extension of lupus from the external integument, of course the diagnosis should be attended with but little difficulty. Where, however, the starting point is within the nose, its recognition is attended with no little difficulty, for as Billroth<sup>3</sup> has pointed out, the gross appearance of the ulcer varies somewhat, and it is not only "pardonable, but even unavoidable" to mistake the disease for a syphilitic lesion. As a rule, our attention is only called to the disease, after the ulcerative process becomes established. At this time, an inspection of the cavity will reveal the existence of a granular mass, projecting above the surface, of a reddish or brownish color, and covered by a brownish-gray crust, the removal of which will show the ulcer beneath, covered with grayish or whitish tenacious mucus. Further investigation will show, that, upon the impact of the probe, the tissue is exceedingly soft, and that the instrument penetrates readily, without exciting much pain or hemorrhage. If the disease is located upon the septum, the probe will readily penetrate through the cartilage, or if this has been destroyed, it passes completely through to the opposite cavity, showing the mass to be of a soft, pulpy, and easily-yielding consistency. A positive diagnosis, however, cannot be based simply on the gross appearance of the mass. The essentially chronic character of the disease, and the fact that it does not yield to anti-syphilitic treatment, add much to our information, while the positive differential diagnosis between lupus, sarcoma, carcinoma and tuberculosis, the only other diseases with which it may be confounded, must be based on the microscopic characters of the tissue.

COURSE AND PROGNOSIS.—Lupus of the nasal mucous membrane would seem to be a much less serious affection, and more amenable to treatment, than lupus of the skin, if we are to accept the cases reported, in that while it runs an essentially chronic course, the destruction of tissue is by no means so rapid, and furthermore, that its progress can be so promptly arrested. Why this should be, it is difficult to state, unless it is that the reparative force in a mucous membrane is more active than in the skin, as shown by the fact, that, whereas any extensive destruction of the

<sup>1</sup> *Centralblatt für Chir.*, Nov. 10th, 1881, p. 721.

<sup>2</sup> *Loc. cit.*

<sup>3</sup> "*Surgical Pathology*," Am. Edition, New York, 1883, p. 490.



skin is followed by a slow process of healing, and furthermore a cicatrix is likely to be very intractable, as in the case of a burn, in a mucous membrane, on the other hand, a cicatrix is a very great rarity, if it ever occurs, and even extensive destruction of tissue is followed by complete restoration of the part to its normal condition. Whatever the cause may be, the fact certainly exists, that unless the disease has invaded too large an amount of tissue a cure may be expected. In the cases above referred to, one of Shurley's is reported unimproved, while in Van Santvoord's case, that of a boy aged fourteen, death occurred, owing to the fact that the disease had invaded the nose, upper lip, hard and soft palate, pharynx and larynx. Aside from these two cases, I find no record of other than a cure. The duration of the disease would seem to have some influence, as Shurley's unimproved case lasted four years, although in Rafin's case a cure was effected at the end of eight years. The age of the patient does not seem to influence the prognosis.

TREATMENT.—It should be borne in mind that the disease extends both by the piling-up, as it were, of an original lupus-nodule, and also by the development of new centres in the surrounding tissues, this process, however, being characterized by an extremely slow stage of progress. The probabilities, however, are that the virus which produces the original disease reproduces itself, and that its progress is due exclusively to a re-inoculation. Hence it becomes important, in dealing with the disease, that every possible seat of infection should be thoroughly eradicated. In Rigal's case, this was accomplished by the excision of the ala and septum of the nose, the disease being both external and internal. Excision, however, is not usually demanded, as all that is necessary can be accomplished by either scraping or scarification, as recommended by Volkmann, or the use of some caustic agent. For this latter purpose, Bresgen made use of chromic acid, but found it not so efficient as the potential cautery, while Rafin used an eighty-per-cent solution of lactic acid. Each individual case, however, will afford ample opportunities of testing the efficacy of any caustic used, and since there seems to be no danger of stimulating a renewed activity in the growth by these agents, they may be pushed to the full extent. Certainly, in most cases, Volkmann's spoon will be the first resort, as the tissue is of a soft and grumous character, and there is no danger of encroaching upon healthy parts. As before stated, the disease is accompanied by a notable impairment of the general health, and hence it scarce needs be added, that the indications for general tonic remedies are always present. Hunt,<sup>1</sup> seems to regard arsenic as a specific, although this observation lacks clinical support.

<sup>1</sup> British Med. Journ., 1862, vol. i., p. 8.

## CHAPTER XXVII.

### RHINO-SCLEROMA.

It seems to be a somewhat prevalent popular idea, that there is some intimate connection or sympathy between mucous membranes and the cutaneous structures. Clinical observation, however, fails to confirm this idea, as it is the almost invariable rule, that a diseased process in the mucous membrane shows no tendency to pass over the muco-cutaneous junction, and involve the integument in a like morbid activity. An exception to this rule, however, is found in that very curious disease, first described by Hebra,<sup>1</sup> to which he gave the name rhino-scleroma, and which consists essentially in the development, in the deeper layer of the mucous membrane or integument, of hard, dense plates, as it were, with somewhat rounded edges, which make their appearance either in the mucous membrane within the nostril, or in the integument of the alæ or upper lip, the starting point usually, being not far from the margin of the nostril. After inception the disease extends by a slow but irresistible progress, either by the enlargement of the original plates, or by new centres of development. Hebra's original description of the disease was based on the observation of nine cases. Subsequent to this, contributions to our clinical knowledge of the disease were made by Tanturri,<sup>2</sup> Geber,<sup>3</sup> Ricchi,<sup>4</sup> Mickulicz,<sup>5</sup> Billroth,<sup>6</sup> Cornil,<sup>7</sup> Frisch,<sup>8</sup> Semon,<sup>9</sup> Cornil and Alvarez,<sup>10</sup> Davis,<sup>11</sup> M. Stukowenco,<sup>12</sup> Schulthess,<sup>13</sup> Doutrelepont,

<sup>1</sup> Wien. Med. Wochenschr., 1870, No. 1, p. 1.

<sup>2</sup> Il Morgagni, 1872, Anno xiv., Dispensa I.

<sup>3</sup> Arch. für Derm. u. Syph., 1872.

<sup>4</sup> Il Raccoglitore Med., xxxvi. (1873), 22, S. 104.

<sup>5</sup> Arch. f. Klin. Chirurgie, 1877, p. 531.

<sup>6</sup> (Quoted by Kaposi, "Path. u. Therapie der Hautkrankheiten," Zweite Auflage, Wien u. Leipzig, 1883, Zweite Hälfte, pp. 632-637.

<sup>7</sup> Progrès Médicale, July 28th, 1883, p. 587.

<sup>8</sup> Wien. Med. Wochenschr., 1885, p. 965.

<sup>9</sup> Brit. Med. Journ., March 7th, 1885, p. 485.

<sup>10</sup> Annal. de Derm. et Syph., 1885, p. 202.

<sup>11</sup> Brit. Med. Journ., May 29th, 1886.

<sup>12</sup> Med. Obosr., No. 20, 1887.

<sup>13</sup> Arch. für Klin. Med., Bd. 41, Heft 1 and 2, 1887.

<sup>14</sup> Deut. Med. Woch., 1887, No. 5, p. 85.

and Dietrich,<sup>1</sup> based on the observation of one or more cases, which would seem to indicate that the disease is not of so rare occurrence as was at first supposed, in that many cases have been unrecognized, from mere lack of knowledge of the existence of such an affection. Thus Weinlechner, as cited by Mickulicz, failed to recognize several cases which came under his own observation, until his attention was especially called to the disease, regarding them as obstinate cases of syphilis.

ETIOLOGY.—Our clinical knowledge of the disease fails to throw any light whatever on the cause of the affection, in that it apparently develops upon patients in perfect health, and usually at a time of life, moreover, when the vital powers are at their best, as most of the cases occurred before the age of forty. In Semon's case it occurred in a boy aged fourteen. Mackenzie<sup>2</sup> suggests that the climate or conditions of life in Southeastern Europe may have some influence as a predisposing cause of the affection, which would seem to carry the suggestion that it bears a certain analogy to goitre in Switzerland, and leprosy in the Orient, and yet I think the fact of so many cases being reported as occurring in the neighborhood of Vienna, is to be explained on the ground of the great activity of the study of skin diseases so characteristic of that city, and the interest excited by Hebra's original paper, inasmuch as later reports indicate that it is met with in most distant parts of the globe; Alvarez's cases having occurred in San Salvador, while Semon's case was that of a Guatemalan, and Davis's case occurred in Egypt. The possibility of the syphilitic origin of the disease is very thoroughly excluded by the large number of reported cases, in which antisymphilitic treatment proved absolutely of no avail.

SYMPTOMATOLOGY.—Subjectively, the disease gives rise to no notable symptoms, in that its slow progress is attended with no local disturbances. There is usually some tenderness on pressure, but aside from this, no pain attends its development. If, however, the growth encroaches upon the respiratory tract so far as to interfere with respiration, of course considerable discomfort arises from this cause. Or again, when it extends backward toward the fauces, or possibly into the larynx, laryngeal stenosis becomes an exceedingly grave condition, as occurred in Schulthess's case. Again, if the disease encroaches upon the oral cavity, it may be a source of infinite distress, as in one of Mickulicz's cases, the oral orifice was so nearly obliterated, that an external operation became necessary, while in another of Mickulicz's cases, the soft palate became adherent to the wall of the pharynx, necessitating an operation in

<sup>1</sup> Zeit. für Heilkunde, 1887. vol. iii., p. 252.

<sup>2</sup> "Dis. of the Throat and Nose," Amer. ed., 1884, vol. ii., p. 407.



this region to relieve the difficulty. Aside from these extreme conditions, the prominent symptoms to which the disease gives rise, consist mainly in a certain amount of deformity, together with a feeling of stiffness and general discomfort about the integument. The progress of the disease is characterized essentially by infiltration of tissue, and no other morbid process is superadded. There is no tendency whatever to a breaking down, or to the formation of an ulcerative process.

**PATHOLOGY.**—According to the original observation of Hebra, the essential pathological lesion which constitutes the disease, consists of an infiltration of the chorium or papillæ of the skin, or when it occurs in mucous membranes, an infiltration of the deep layer of the mucous membrane with small round cells. As the result of this infiltration, the normal structures of the tissue are so far encroached upon as to give rise to an atrophic process, simply as the result of pressure involving the gland-structures, the connective tissue, and in fact, all the normal elements of the membrane and integument. This would seem to indicate that the morbid process is inflammatory in character, a view entertained by Mickulicz,<sup>1</sup> although, from a clinical standpoint, there are no evidences whatever of an inflammatory process. Still further changes are observed by Mickulicz, which consist in a transformation of the round cells into spindle cells, and finally into a dense fibrous connective tissue. Tanturri<sup>1</sup> makes the statement that the disease is essentially epithelial in character, and yet this view is probably based on an examination of a very superficial portion of the tissue removed, as he is entirely unsupported. Cornil<sup>1</sup> finds a small, rod-like bacillus inclosed in a hyaline capsule, closely resembling Friedländer's pneumococcus, from which he draws the conclusion, that the disease is parasitic in its nature, although Dietrich, accepting the view that the disease may perhaps be due to a microbe, whether Cornil's or some other, yet asserts that it results more probably from a mixed infection than from a specific germ, and that the existence of the microbe is entirely adventitious, and not essential to the disease. Frisch<sup>1</sup> finds a small rod-shaped bacillus in the round cells, especially in those which have undergone retrograde metamorphosis. He believes that the connective tissue is the result of inflammation set up by the bacteria.

It is interesting to note, that the disease has been reproduced in animals, from cultures of the bacilli, by Stepanow.<sup>2</sup> The special changes which take place in the tissues are shown in Fig. 103.

**DIAGNOSIS.**—The disease makes its appearance in small, rounded, flattened nodules, which may project beyond the skin, giving rise

<sup>1</sup> Loc. cit

<sup>2</sup> *Monatsschrift für Ohrenheilk.*, 1889, vol. xxiii., p. 5.

to slight tumefaction, or it may be entirely beneath the skin or mucous membrane, without marring its normal contour. The tissue covering it may be of a healthy color, although ordinarily it is of a dusky-red tinge. These nodules may occur in considerable numbers, entirely separated from one another, or they may be contiguous. They develop by an exceedingly slow progress of growth, both in size and superficial area, extending to neighboring tissues. The extension of the growth is usually laterally, although it may pile itself up, as it were, into irregular masses. It is hard to the



FIG. 103.—Rhinoscleroma. *E*, Thickened epidermis; *L*, broadened stratum lucidum; *R*, rete mucosum; *P*, papillary layer; *C*, tracts of dense fibrous connective tissue; *I*, *Z*, small cellular infiltration of derma.

touch, usually tender, but does not give rise to any pain. The tissue surrounding the growth presents an absolutely normal appearance, there being no areola of redness, or indeed any vascular engorgement, unless, as occasionally occurs, the tissue over the surface of the tumor is slightly reddened. There is never any œdema, or swelling of the tissues beyond the growth. The growth itself presents to the touch a hard, dense, cartilaginous feeling, or even, in advanced cases, it gives the impression of bone. The only affections with which it might be confounded are sarcoma, carcinoma, and syphilis. The characteristic appearance of malignant disease is a soft grumous mass, bleeding readily on touch, in connection with an acrid discharge, which in all cases

makes the diagnosis clear. The only manifestation of syphilis with which it might be confounded in the nasal cavity, is a gummy tumor, whose smooth outline differs essentially from the nodular character of rhinoscleroma, while the latter presents a characteristic stony feeling, never met with in the syphilitic manifestation. Any doubt in the diagnosis, is, of course, quickly dispelled by the administration of anti-syphilitic treatment.

PROGNOSIS.—The disease is essentially intractable, and is usually regarded as absolutely incurable. With the exception of Doutrelepont's<sup>1</sup> case alone, no remedies or therapeutic measures

<sup>1</sup> Loc. cit.

have ever been resorted to, which seemed to have the slightest effect in controlling its progress. This case, however, possesses the special interest of having been cured, and is therefore reported somewhat in full as follows:

A male, aged 34, previously healthy and with no syphilitic history, presented with the history of having noticed a small, round, knotty swelling on the right upper lip, near the nasal orifice, which commenced seven months previously, and had slowly extended, until it involved the whole of the upper lip, and had invaded the nasal cavity, attacking the lower portion of the septum and the right ala. When seen, the upper lip was swollen to the thickness of the thumb, while the whole circumference of the nostril was thickened, the infiltration presenting a hard, bony sensation to the touch, while the surface showed a glistening appearance, of a reddish-brown color. A small portion was removed for microscopic examination, and found to present the characteristic round-cell infiltration of rhino-scleroma, together with Cornil's bacillus. Local applications were made, of a one-per-cent corrosive sublimate ointment in lanolin twice daily, resulting in the complete disappearance of the disease in three months and a half, with the exception of a small nodule on the septum.

If this case be accepted without question, it does not harmonize, in its clinical history, with the other cases reported, in that so rapid a development, and so large an invasion of tissue at the end of seven months is quite unusual. The question arises, then, whether this may not have been a syphilitic lesion, cured by mercurial inunction. Certainly, if this case is unquestioned, it affords the only justification for looking upon these cases as other than utterly hopeless as regards any expectation of either arresting or even curtailing the progress of the disease.

As regards life, however, the prognosis is favorable, as the disease is purely a local one, for its onset does not necessarily impair the general health, and involves no tendency to death, except where it interferes with important functions by its mere location, as for instance when it extends to the larynx, giving rise to stenosis and threatened suffocation. With this exception, the disease apparently does not shorten life, and simply continues a source of discomfort to the victim until death occurs, usually from intercurrent disease. Thus in Schulthess's<sup>1</sup> case the disease had extended so far at the end of twenty-four years, as to involve the integument of the external nose, upper lip, the upper and lower pharynx and the larynx, giving rise to stenosis of the larynx, demanding tracheotomy, the patient being still living at the time of the report. This would appear to be the limit to which the disease ever extends. As having its origin in or near the nostril, it extends to the external nose, upper lip, and in rare cases encircles the mouth. After entering

<sup>1</sup> Loc. cit.



the nasal cavity, it travels slowly backward, involving the pharynx, soft palate and larynx, after which its lateral extension seems to cease, while its remaining energy is expended in adding to the already existing tumefaction.

Ganghofner,<sup>1</sup> however, believes that the disease may sometimes originate and develop in the larynx and trachea, giving rise to stenosis, without the nose and mouth being affected.

TREATMENT.—Experience has fully demonstrated, that the extirpation of these growths exercises no influence whatever in arresting their extension. Furthermore, their destruction by caustic agents is equally futile, although neither of these measures seems to have any deleterious effect in stimulating the activity of their development. The only indication, then, for surgical resort, is where it is demanded as a remedial agent, as for instance, when the nasal passages become occluded, it becomes necessary to remove the growths in order to re-establish nasal respiration. Internal medication is of no avail. The one suggestion that can be made, then, in regard to radical treatment, is found in the successful result in Dou-trelepont's case, by the application of corrosive sublimate, although the suggestion of Voltolini<sup>2</sup> as to the use of electrolysis may be of value.

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<sup>1</sup> Zeit. für Heilk., 1880, i., p. 350.

<sup>2</sup> "Die Krankheiten der Nase," Breslau, 1888, p. 258.

## CHAPTER XXVIII.

### NASAL POLYPUS, OR MYXOMA.

THIS term nasal polypus is usually given to a variety of growths which are met with in the nasal cavity far more frequently than any other form of neoplasm. They are so designated, on account of their fancied resemblance to the aquatic polyp, a low order of zoöphite. They occur either singly or in groups, and present a grayish, semi-opaque appearance, with a moist glistening surface, not unlike the pulp of a grape. They have been recognized and well described by all medical writers from the earliest times. These growths occur more frequently, I think, than is generally recognized, although I can scarcely agree with Zuckerkandl<sup>1</sup> who makes the somewhat startling statement, that he finds either polypi or polypoid hypertrophies (polypöse Wucherungen) in one of every eight or nine autopsies. Under this latter term, he undoubtedly embraces many cases which would scarcely be recognized during life as true polypus, but should be regarded probably as cases of hypertrophic rhinitis. My own experience, however, shows that of one thousand four hundred and eighteen cases of ordinary catarrhal disease seen in private practice, exclusive of my hospital cases, one hundred and thirty-four showed the presence of fully developed polypi, or about one case of polypus for every eleven cases of ordinary catarrhal trouble.

Zuckerkandl, in his classification of these growths, describes five forms. His first form he calls hypertrophy of the mucous membrane, a condition which he asserts occurs only in the respiratory region and which he describes as follows:<sup>2</sup>

Group 1st. "The mucous membrane is thickened, swollen, and largely interspersed with dilated glandular proliferations," differing, as we see, essentially from an ordinary hypertrophic rhinitis.

Group 2d. True polypi. (a) with small, (b) with broad pedicles.

Group 3d. Small and warty, or mound-like tumors on the external wall of the nose, and on the lips of the hiatus semilunaris.

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<sup>1</sup> "Normale und Pathologische Anatomie der Naserhöhle," Wien, 1882, p. 76.

<sup>2</sup> Loc. cit., p. 76.

Group 4th. Polypoid proliferations, (a) on the turbinated bones, (b) on the septum.

Group 5th. Papillomata.

From a careful reading of Zuckerkandl's text, I think the inference can be drawn, that in his fourth group of polypoid proliferations, he describes what has been already alluded to in the chapter on hypertrophic rhinitis as hypertrophy of the mucous membrane covering the posterior termination of the lower turbinated bone. Furthermore, I think papillomatous growths are hardly to be classified as polypi. Hence, we easily understand how Zuckerkandl should have made his curious statement, as to the frequency of polypoid disease. The term polypus, I think, should properly only be used to describe the typical myxomatous growths. They occur as pedunculated or sessile growths, and vary in size from that of bird-shot to the limit of the nasal cavity.

**PATHOLOGY.**—The prevailing type of these tumors is that of pure myxoma, with certain more or less well-marked variations, attendant, probably, either on their immediate origin, or perhaps on certain adventitious features of their subsequent development, surroundings, or life. According to pathologists, the external surface of the tumor is covered by the epithelial layer of the mucous membrane lining the nasal passages, the epithelium frequently being ciliated. Within this envelope, we have true hypertrophy of the structures of the mucous membrane, namely the glandular and connective-tissue elements, with no increase in the vascular elements. The tumor may be very rich in glands, or may be absolutely without glandular structure, and consists simply of a delicate reticulum of connective tissue, in which we find imbedded the characteristic stellate myxomatous cells, the embryonic connective-tissue cell, the bulk of the tumor being made up of a gelatinous intercellular substance containing very largely of mucin (see Fig. 104).

Billroth<sup>1</sup> classes nasal polypi among the adenomata, while Erichsen<sup>2</sup> considers these tumors as myxomata. Butlin<sup>3</sup> takes the same view, and further<sup>4</sup> states that adenoma of the nose is almost invariably polypoid, and that it differs only slightly in appearance from those polypi which contain no glands, although it is firmer in consistency than the ordinary mucous polyp, and is covered with normal mucous membrane.

I think we find here the same confusion which has already been noted in regard to Zuckerkandl's classification of these growths, as

<sup>1</sup> "General Surgical Pathology and Therapeutics," Amer. ed. N. Y., 1883, p. 748.

<sup>2</sup> "Science and Art of Surgery," Amer. ed., Phila., 1881, vol. ii., p. 738.

<sup>3</sup> "International Encyclop. of Surgery," vol. i., p. 856.

<sup>4</sup> *Ibid.*, p. 904.



to what really constitutes a nasal polypus, both from a pathological and clinical point of view. The inference is clear, that these observers are describing growths which, from a purely clinical point of view, are not to be regarded as typical nasal polypi. Thus Zuckerkandl<sup>1</sup> describing his fourth group, gives an accurate description of hypertrophy of the extremity of the lower turbinated body.

While cystoma, as will be seen when we come to the discussion of that form of tumor, is met with very rarely in the nasal cavity, cystic metamorphosis is probably a not infrequent occurrence in nasal polypi. This would seem therefore, to go far toward

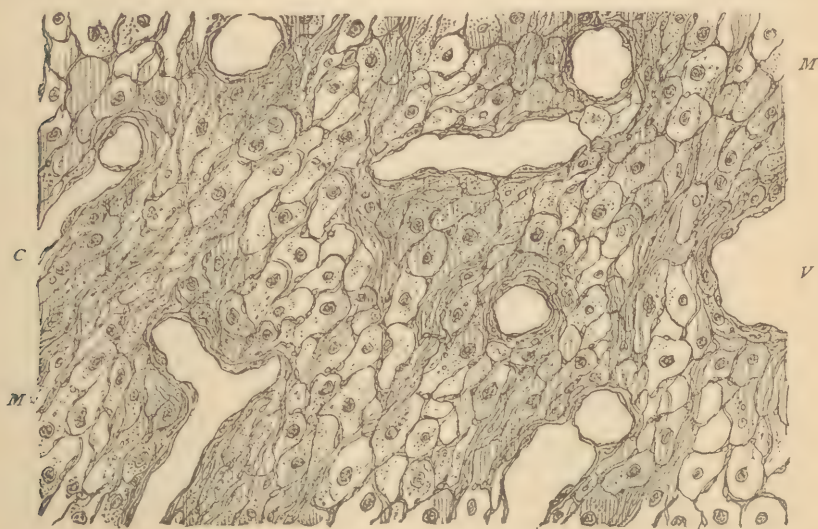


FIG. 104.—Myxoma, or Nasal Polypus. *M, M*, Myxomatous tissue; *C*, wide capillary blood-vessel; *V*, vein in transverse section.

demonstrating that glandular structure is present in the myxomata; according to Robin,<sup>2</sup> cystic degeneration is due to a general hypertrophy of the acinus, together with an atrophy of its duct, as the result of which there is an increased secretion, which failing of free exit, collects in the gland, whose walls gradually yield to the pressure and become dilated. That this process is not constant, however, has been shown by Billroth,<sup>3</sup> who states that cystic degeneration does not necessarily depend always upon obstruction of the gland duct, but may result from certain changes in the epithelial cells lining the glands, their ducts remaining patent. From a clini-

<sup>1</sup> Loc. cit., p. 76.

<sup>2</sup> Gazette des Hôpitaux, 1852, p. 46.

<sup>3</sup> "Ueber den Bau der Schleimpolypen," Berlin, 1855.

cal point of view this form of degeneration is illustrated in a case reported by Moure,<sup>1</sup> who cites a case of "cystic polyp" partially occluding the posterior nares of the left side, in a patient suffering from mucous polypi in the right nostril. After several unsuccessful attempts to remove the tumor with the snare, the pedicle, which was located in the posterior part of the middle meatus, was detached by means of a polypus forceps and the growth expelled through the mouth in the form of a pouch, the liquid having already been discharged. The cyst when distended was about the size of a small egg. The author looks upon this growth as a mucous polyp, a portion of which had undergone cystic degeneration, a condition which he does not consider uncommon, especially where

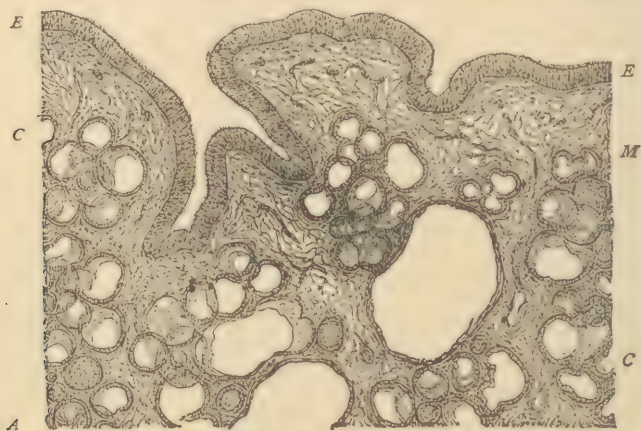


FIG. 105.—Cystic Degeneration of Ordinary Nasal Polypus, or Myxoma. *E*, Columnar ciliated epithelium; *M*, myxomatous tissue; *A*, acinous gland; *C*, *C*, glands, transformed into cysts.

polypi pass through the posterior nares into the pharynx. This degeneration is well shown in Fig. 105.

ATTACHMENT.—All authorities unite in the statement that these growths spring, as a rule, from the mucous membrane covering the middle turbinated bone. It remained for Zuckerkandl,<sup>2</sup> however, to make such a thoroughly exhaustive study of this feature of the disease, that little can be said, other than to quote the following statistics as regards the location of the growths, in thirty-three cases which he examined *post mortem*.

(a) The lips of the hiatus semilunaris, . . . . .	15
(b) In the infundibulum, . . . . .	1
(c) In the ostium ethmoidale, . . . . .	1
(d) In the ostium frontale, or maxillare, . . . . .	1

<sup>1</sup> Journal de Méd. de Bordeaux ; 1886-7, vol. xvi., p. 64.

<sup>2</sup> Op. cit., p. 78, et seq.

- (e) On the edge of the middle turbinated bone,  
(the median and lateral edge of its lower  
border), . . . . . 4
- (f) On the lips of the accessory fold which some-  
times lies on the medial side of the middle  
turbinated bone, . . . . . 3
- (g) In the bulla ethmoidalis, . . . . . 2
- (h) In the ethmoidal cells, . . . . . 3
- (i) On the septum, especially in the respiratory  
portion of the nasal cavity, . . . . . 3

We thus find thirty of his cases had their origin upon or in the immediate neighborhood of the middle turbinated bone, the other three cases springing from the septum. All of these last, it should be stated, were of a sessile character, while Heymann,<sup>1</sup> out of two hundred and ninety-seven cases, found seven springing from this site, without specifying the character of the growths. These latter statistics were based on an observation of thirty-nine cases. Seven of them, however, were cases of irregular hypertrophy, and should not, I think, be included in this category. Zuckerkandl's investigations were made on the cadaver, and hence the exact site of the growths could be determined with a degree of accuracy which it is impossible to attain by an inspection during life, which would account for the probable inaccuracies of the statement of Petrequin<sup>2</sup> and of Voltolini,<sup>3</sup> that these growths sometimes spring from the roof of the nasal cavity, or that of Wagner,<sup>4</sup> that they may spring from the lower turbinated bones. Schech<sup>5</sup> is alone I think in the statement, that these growths may spring from the floor of the nasal cavity.

ETIOLOGY.—It is difficult to assign any definite cause for the occurrence of mucous polypi. They are certainly not due to any impairment of general health or constitutional diathesis, for, as a rule, they occur in patients in vigorous health. Sajous<sup>6</sup> says that "they are usually considered to be due to chronic inflammation of the Schneiderian membrane," a view which Mackenzie<sup>7</sup> very properly controverts, on the ground that while catarrh is very common among children, polypus is very rare before the age of sixteen. Moldenhauer<sup>8</sup> also takes this view, on the ground that catarrhal

<sup>1</sup> Berlin. Klinische Wochenschrift, Nos. 32 and 36, 1886.

<sup>2</sup> "Traité d'anatomie topographique," Paris, 1857.

<sup>3</sup> "Die Anwendung der Galvanokaustik," Vienna, 1871.

<sup>4</sup> "Diseases of the Nose," N. Y., 1884, p. 117.

<sup>5</sup> "Diseases of the Mouth, Throat and Nose," Eng. ed., Edinburgh, 1886, p. 262.

<sup>6</sup> "Diseases of the Nose and Throat," Phila., 1886, p. 137.

<sup>7</sup> "Diseases of the Throat and Nose," Amer. ed., 1884, vol. ii., p. 352.

<sup>8</sup> "Die Krankheiten der Nasenhöhlen," Leipzig, 1886, p. 138.



inflammation most frequently involves the mucous membrane covering the lower turbinated bones, which is never the site of a mucous polypus.

I am disposed to think that the most rational explanation of the development of these growths, is in the fact that the mucous membrane covering the middle turbinated bone is of very soft, delicate consistency, and is actively concerned in the respiratory function of the nose, viz., serous exosmosis, and that as a result of this serous transudation, the membrane becomes saturated or water-soaked as it were, in such a manner as to lead to the development of this peculiar myxomatous condition. As to what peculiar nutritive disturbance in the meshes of this tissue predisposes to this form of degeneration, I have no suggestion to make. The view is based entirely on the fact of the frequent development of nasal polypi in those curious cases of profuse watery discharge from the nasal mucous membrane, already described in the chapter On Nasal Hydrorrhœa (pp. 261-263), which occurs, not as the result of the impact of vegetable spores upon the nasal mucous membrane, as in hay-fever, but is perennial and diurnal, that is, it occurs usually at certain hours every day, through the whole year. In the early stages of the attacks, no morbid condition of the mucous membrane can be discovered, as a rule, but in a number of instances which have come under my observation, after the disease has persisted for a certain length of time, typical mucous polypi have developed on the membrane covering the lower border of the middle turbinated bone, which after development, subject as they are to the action of gravitation, together with the traction influence, of blowing the nose, and the to-and-fro movement of the current of air in respiration, gradually sag down as it were, and becoming filled with serum, drag on their original attachment to the membrane above, until a pedunculated tumor is developed (see Fig. 106). A somewhat similar view is suggested by Hopmann,<sup>1</sup> who thinks the primary lesion which leads to the development of the growths, is in some impairment of circulation in the efferent vessels, resulting in an œdematous condition of the membrane. Billroth,<sup>2</sup> whose views as to the glandular character of these growths is adopted by Zuckerkandl, considers that the tumor originates as an adenoma, but during development some of the ducts become occluded, resulting in a myxomatous degeneration of the glandular tissue. A case has been reported by Gerdy<sup>3</sup> in which the development of these growths was dependent on a fracture of the vomer, an observation which would seem to harmonize with what is frequently observed in con-

<sup>1</sup> As cited by Moldenhauer, *op. cit.*, p. 138.

<sup>2</sup> *Loc. cit.*

<sup>3</sup> "Des polypes et de leur traitement," Paris, 1883.

nection with syphilitic necrosis either of the vomer or of the turbinated bones, where we not infrequently find mucous polyps developing on the edges of the ulcerated surfaces.

They are more common in males than in females. Mackenzie, in two hundred cases, finds one hundred and twenty-three in men and seventy-seven in women. Erichsen<sup>2</sup> is alone, I think, in his statement that they are more frequently found in females. Of one hundred and twenty-four cases recorded by myself, seventy-eight were males and forty-six were females. As to age, they occur

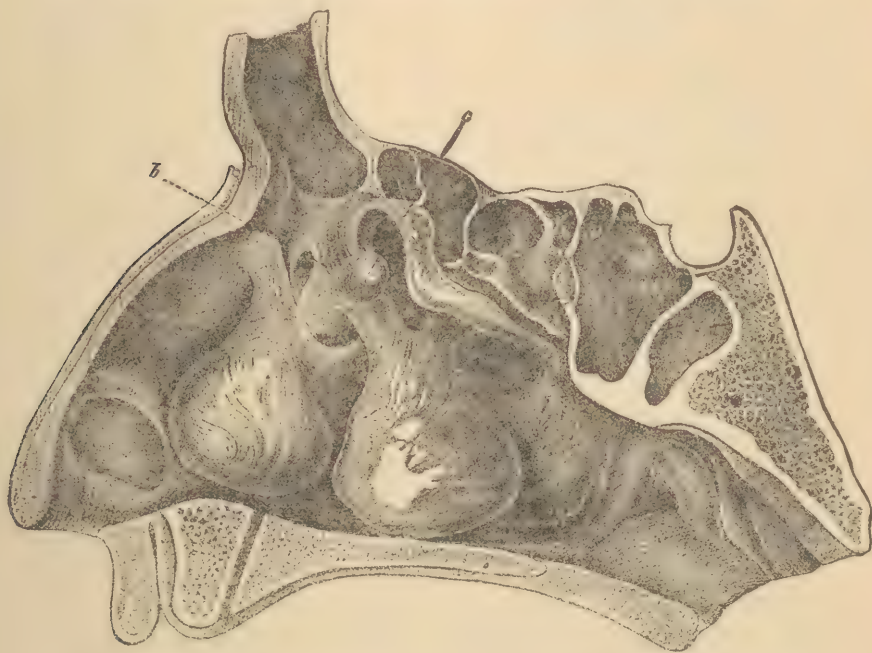


FIG. 106.—Nasal Polypi. (Zuckerlandl).  $\delta$ , Infundibulum; c, cyst of the mucous membrane.

most frequently between twenty and thirty. They rarely occur before the age of fifteen, after which they develop with decreasing frequency after thirty, up to seventy, or even later. Lennox Browne<sup>3</sup> is undoubtedly fully justified in making the broad statement that "polypi may occur at almost any age." He states that he has operated on patients as young as seven and as old as eighty. Beverley Robinson<sup>4</sup> cites a case of nasal polypi occurring in a boy three years of age, the growth being successfully removed with the forceps, while a very curious instance of the disease has been re-

<sup>1</sup> Op. cit., p. 353.

<sup>2</sup> Op. cit., p. 386.

<sup>3</sup> "The Throat and its Diseases," 2d ed., London, 1887, p. 520.

<sup>4</sup> "Nasal Catarrh," 2d ed., N. Y., 1885, p. 251.

ported by Krakauer,<sup>1</sup> in which he removed twelve polypi from the right nasal fossa in a child of four and a half months.

Heredity would ordinarily seem to have little influence on the development of these tumors, and yet Heymann<sup>2</sup> has observed the following curious case: The patient suffering from this trouble was the father of four children, each of whom had polypi, one married son had six children, and three of these suffered from the same neoplasm. Somewhat similarly, I had recently under treatment two brothers with nasal polypi, whose sister had a myxo-fibroma, while from the son of one I removed a fibroma. These cases, however, I should be disposed to regard as mere coincidences, rather than as showing evidence of heredity, as the causation for these growths.

A deformed septum is not infrequently associated with the existence of nasal polypi, and probably exercises an important causative influence in their development, in the same manner, probably, as in the development of hypertrophic rhinitis. In these cases the tumors are usually found in the more roomy cavity, though in rarer cases they occur on the obstructed side.

SYMPTOMATOLOGY.—The first and earliest symptom that occurs in connection with these growths, is intense irritation in the upper passages of the cavity, manifesting itself in more or less violent attacks of sneezing, accompanied with watery discharge, although Lennox Browne<sup>3</sup> makes the broad and somewhat curious statement that "sneezing is seldom exhibited, immunity from this disagreeable symptom being doubtless due to a blunting of the sensibility of the nerve-endings." Notwithstanding this assertion, I do not hesitate to say that no symptom is more constantly and invariably present in these cases, and it is due to the intense sensitiveness of the mucous membrane, especially over the middle turbinated bodies, which is caused by the presence of the growths. The watery discharges, which accompany the attacks of sneezing, have their source in the mucous membrane proper, and not in the polypus as is often asserted. This symptom is due probably to a paresis of the vasomotor control of the respiratory exosmosis, under the action of which there occurs an excessive serous transudation. This fluid, making its way through the membrane, produces an abnormal irritation of the parts, causing burning or itching sensations, referable to the bridge of the nose. As the growth develops in size, nasal stenosis sets in, which is at first most marked in the upper portion of the cavity, a form of stenosis which is oftentimes more distressing in the nervous irritability which it causes, than if the obstruc-

<sup>1</sup> *Revue Médicale*, August 22d, 1885.

<sup>2</sup> *Loc. cit.*

<sup>3</sup> "The Throat and its Diseases," 2d ed., London, 1887, p. 521.



tion were in the lower passages, on account of the sense of fulness, with the distention, which it causes in the more sensitive olfactory region. The stenosis in this region is due more to the swelling of the membrane excited by the presence of the polypi, rather than by the polypi themselves. As they increase in size, however, obstructions occur in the lower passages, which eventually become totally closed as the result of their presence. They commence, as a rule, in one fossa, but I think it is the rare exception that they do not develop sooner or later on the other side. The cause of this is not obscure. The obstruction on the one side resulting from the growths, compels the opposite passage to do double duty, with the result of diminished air-pressure, which acting on the soft tissues covering the middle turbinated bone, already under the influence of whatever constitutional predisposition may have led to the primary development of the neoplasms, necessarily results in the same morbid process here. Mackenzie<sup>1</sup> finds the growths bilateral fifty-nine times in two hundred patients, which would indicate merely that the disease was recognized and subjected to treatment before it had extended to the opposite side, in more than two-thirds of his cases.

Loss of the sense of smell occurs early in the development of the disease, not entirely as the result of obstruction due to the presence of the growth, but rather to a certain disorganization which occurs in the mucous membrane lining the olfactory region. The stenosis, due to the presence of the growths, varies notably under varying atmospheric conditions, which has given rise to the assertion by probably a majority of writers, that these growths possess a certain hygroscopic character, under the action of which they absorb moisture and become swollen on damp days. I do not think a myxomatous growth possesses the power either of absorbing moisture, or of giving it forth in any marked degree, but should attribute this symptom to the swelling of the mucous membrane lining the nose, owing to the excessive irritability caused by the presence of the growths. By this irritability, we mean essentially an intense hyperæmia due to a weakness of vaso-motor control. Wherever this exists, as in hay-fever and allied affections, the terminal filaments of the nerves are in a state of constant irritability, and thus become exquisitely sensitive as the direct result of this persistent hyperæmia. As a consequence, these patients become exceedingly susceptible to changes in the weather, all the symptoms being notably aggravated during the cold and damp days of spring and fall, while the milder seasons afford notable relief. The discharge from the nose is usually rather profuse, and

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<sup>1</sup> Op. cit., p. 354.

while the disease is confined to the nasal cavity proper, is of a thin watery character; or when the nasal membrane is much irritated, it may be of a grayish semi-transparent color, and consist largely of a mucous or semi-mucous discharge.

In cases of long standing we not infrequently find a profuse discharge setting in, which consists of bright-yellow, fluid pus. I doubt very much if a mucous polyp ever gives rise to a purulent discharge, whose source is in the nasal cavity proper, hence I think that a discharge of this kind should always be understood as indicating the supervention of purulent disease of the antrum, or of one of the accessory cavities. The method of development of this complication is quite simple. The orifices of these cavities having become occluded by the presence of the growths, the normal secretion accumulates to such an extent that a purulent inflammation is the natural result, for as stated before, wherever we have inflammation of the mucous membrane lining a closed cavity, suppuration necessarily ensues. Occasionally a mucous polyp may develop in the antrum, or possibly it may make its way into the antrum from the nose. In a case reported by Pedro Verdós<sup>1</sup> a growth made its way into the antrum, completely filling it and protruding below the lower eyelid, causing an external deformity. The growth was successfully removed, but the question arises whether this was not a case of myxo-fibroma, for as a rule, simple myxomatous growths in the antrum merely fill its cavity, without producing facial distortion.

As already stated in the discussion on nasal reflexes, no morbid lesion of the nasal cavities is more frequently the source of reflex disturbances than nasal polypus; hence, asthma and hay fever are associated with these growths in a not inconsiderable proportion of cases, although Hack<sup>2</sup> considers polypi as rather an infrequent intra-nasal condition, in cases of this disease. This question, however, is more properly discussed elsewhere. For the same reason, ocular symptoms not infrequently occur in connection with the presence of these growths. The aural symptoms due to nasal polypi are to be regarded not as reflexes, but as direct symptoms due to stenosis with interference of normal respiration, their method of development being identical with that described in the chapter on hypertrophic rhinitis. These symptoms consist mainly in the development of chronic catarrhal otitis media, which, according to my experience, is almost invariably present in a more or less well-marked degree, where the growths have attained sufficient

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<sup>1</sup> *Revista di laringologia, otologia y rinologia*, May, 1887.

Wien. Med. Wochenschr., 1883, No. 10, p. 279.

size to produce notable stenosis, although Woakes<sup>1</sup> somewhat guardedly states that patients with nasal polypi rarely complain of deafness, due, as he says, to the fact that these growths rarely extend to the lower meatus, which is really the auditory passage. This statement is undoubtedly correct, but the various other discomforts attendant upon nasal polypi are so great, that the patients do not, as a rule, complain of prominent ear-symptoms, and yet by careful test, as before stated, every case will show marked diminution of the hearing distance.

Suppurative otitis I have not seen, although this complication has been observed by Barth.<sup>2</sup> Tinnitus aurium also is mentioned by Robinson<sup>3</sup> as a complicating symptom. Laryngitis, and bronchitis, are very liable to occur sooner or later as the result of the nasal stenosis. The voice is affected according to the extent of the nasal obstruction, its resonance being destroyed. To one familiar with these cases, I think the voice presents characteristics which enable us to recognize a case of nasal polypus almost immediately on hearing the voice. It is a peculiar dead voice, and yet with something more of resonance than the dead voice of an adenoid—a dead voice, perhaps with a faint nasal tone in it. The facial expression is also characteristic, in that there is that peculiar thickness about the bridge of the nose which always suggests nasal stenosis, whether from a cold in the head or other causes. Deformity of the external nose is never present in a pure myxoma, the growths as they fill the cavity oozing out, as it were, from one or the other nostril, rather than pressing against the lateral walls.

DIAGNOSIS.—The recognition of a nasal polypus depends entirely on ocular inspection, which should always be made with sunlight, or an equally powerful illuminator, for I am confident that these growths are often overlooked when the ordinary gas-jet is the source of light. With proper illumination, therefore, I do not hesitate to say that the growth may be recognized, provided there is no marked deformity of the nose, in its very earliest stages, and even before it protrudes from beneath the middle turbinated bone. Of course if the growths have extended down into the lower meatus, they can then be recognized by the unaided eye, but in very early stages, I think, their recognition becomes a matter of exceeding importance, in that the polyp-breeding tissue at this time is very limited in extent, while in the latter stages of the disease, the whole of the mucous membrane covering the middle turbinated bone may become degenerated. As an aid to diagnosis we should always

<sup>1</sup> "Post-Nasal Catarrh," Am. ed., Philadelphia, 1884, p. 190.

<sup>2</sup> *Revue mensuelle de laryngologie*, No. 4, p. 208.

<sup>3</sup> "Treatise on Nasal Catarrh and Allied Diseases," 2d ed, N. Y., 1885, p. 254.



make use of cocaine, to thoroughly contract the blood-vessels and open up the cavity for thorough inspection. When this is accomplished, if a polypus is present it will be seen to present a striking contrast in color with the normal nasal mucous membrane of the passage, while it also presents a tumefaction not belonging to the normal contour of the cavity. The color, furthermore, of a polypus resembles no other growth or abnormality that is found in the nasal cavity. It is of a bluish-gray color, with a bright, shining, glistening surface, not unlike, as before suggested, the pulp of a grape, but with the addition of a bluish rather than a greenish tint.

If the growth has developed so far as to protrude below the middle turbinated bone, we have an additional aid to diagnosis, in the fact that it becomes freely movable in the cavity; hence, in these cases a probe should always be used, to test this mobility, or it may be seized with a pair of small mouse-toothed forceps, such as are shown in Fig. 112, and the attempt made to pull it forward or downward. Furthermore, on the impact of a probe it is easily indented, showing a certain resiliency, by which the indentation disappears readily on the removal of the probe. A mistake in diagnosis I think need never occur with a proper illuminating apparatus. Its gross appearances are so strikingly in contrast with either sarcoma or carcinoma, in its smooth, glistening, semi-opaque surface, as to render it unnecessary to indicate the points of differential diagnosis. It differs essentially from a fibroma, in that this form of neoplasm is hard, dense, and of a bright, pink color and is, as a rule, immovable. Moreover, hemorrhage is never a direct symptom of the nasal polyp, although very frequently met with in connection with the denser tumors. A deflection of the septum presenting near the nostril might be mistaken by the inexperienced for a nasal polyp. Its density and immobility is always sufficiently evident to render such a mistake unnecessary. The same may be said of ecchondromata and exostoses. Abscess of the septum may very closely simulate a mucous polyp, but this affection presents a soft, fluctuating tumor, whose character can easily be ascertained by careful manipulation of the probe, or better still by puncture with a bistoury. As a rarely possible source of error Moure<sup>1</sup> refers to a meningocele projecting into the upper part of the nasal cavity, although its reducibility and compressibility, together with the cerebral symptoms which accompany it, should enable one to avoid any such error in diagnosis. A case of this kind was found by Cruveilhier,<sup>2</sup> on *post-mortem* examination, protruding through the cribriform plate of the ethmoid bone, presenting a soft, fluctuating

<sup>1</sup> Op. cit., p. 475.

<sup>2</sup> As quoted by Mackenzie, op. cit., p. 360.

tumor in the nose, closely resembling in appearance and outline a mucous polyp.

PROGNOSIS.—The existence of nasal polypi involves no serious danger to life other than in their involvement of the integrity of the mucous membrane of the whole air tract, giving rise to bronchitis, asthma, hay fever, etc., whereby the general health may become somewhat impaired. If not subjected to treatment they develop with increased rapidity, as the polyp-breeding surface increases in area, and the nasal cavities become completely stenosed. There is no tendency to a spontaneous cure, hence the prognosis is mainly dependent upon the success of treatment. A question of perhaps more interest is, whether a myxomatous tumor preserves its original type, or whether it may undergo changes of a malignant character. This question is naturally much confused, in that it may be that those cases which have undergone malignant degeneration, have been largely the result of crude methods of extirpation, rather than of any inherent tendency of the myxomatous tumor to undergo this form of degeneration. Billroth<sup>1</sup> states that the view that these growths may take on carcinomatous degeneration, has been accepted as an article of faith, rather than proven, since the only absolute proof that we could have of such a change, would be to find a case in which the same tumor, beginning as a mucous polyp, would subsequently develop into one of the malignant type, and such a case to his knowledge does not exist. In this same work, however, he cites a case which from its history seems to have been at first one of mucous polyp, which after operation apparently took on a carcinomatous degeneration. He also reports a second case which may possibly have been an early stage of a similar change. In a subsequent work,<sup>2</sup> however, he goes so far as to state that the tissue found in nasal polypi is frequently adeno-sarcomatous, but is somewhat vague as to the clinical significance of this tissue. J. W. Hulke<sup>3</sup> reports a case of nasal polyp, which after operation at varying intervals of time, developed into malignant disease, although the report of the case is unsatisfactory. Sajous<sup>4</sup> makes the general statement, without further comment, that nasal polyps occasionally degenerate into sarcoma. A search through the literature of the subject fails to reveal on what grounds this statement has been made, and yet a somewhat vague impression of this sort seems to prevail in the minds of most observers. Thus, Lennox Browne,<sup>5</sup> after asserting that after operation these polyps

<sup>1</sup> "Ueber den Bau der Schleimpolypen," Berlin, 1855, p. 34.

<sup>2</sup> "General Surgical Pathology and Therapeutics," Amer. ed., N. Y., 1883, p. 748.

<sup>3</sup> Ophthalmic Hospital Reports, vol. iv.

<sup>4</sup> "Diseases of the Nose and Throat," Phila., 1886, p. 139.

<sup>5</sup> Op. cit., p. 523.

assume more of a fibrous character, states also that they frequently show under the microscope evidences of sarcomatous structure. Now Butlin<sup>1</sup> makes the statement that it is impossible to distinguish microscopically between round-celled sarcoma and normal granulation tissue, which would seem to infuse an additional element of obscurity into the question. Beyer<sup>2</sup> who has made a somewhat laborious study of this question, reports one case under his own observation, of a man fifty years of age, operated upon by the galvano-cautery for "nasal polypus," who two months later had developed cancerous papilloma (Zottenkrebs). Schmiegelow<sup>3</sup> cites a case, reported by Schäffer, of a man forty-two years of age with nasal polypi and naso-pharyngeal fibro-sarcoma, in which the polypi in the course of a year took on sarcomatous degeneration. An interesting case bearing on this point came recently under my own observation. A German, aged forty-eight, who for a year had suffered from nasal polyps, which had been operated upon a number of times with forceps, followed by their rapid recurrence, came under my care November 11th, 1887. I removed a number of small polypi, and came down upon a soft, grumous-looking mass springing from beneath the middle turbinated bone, which bled profusely on the slightest manipulation. A small portion was removed, and under the microscope the growth was shown to be angio-myxo-sarcoma. This patient was seen a number of times, at intervals of a fortnight, and the whole growth successfully extirpated by means of the cold wire snare. When last seen he had gone six months without a recurrence. The microscopic character of the neoplasm in this case (see Fig. 107) would seem to lend weight to the view that a myxoma may take on sarcomatous degeneration. I think Schäffer's case may be excluded, as throwing no special light on the question under discussion. The other cases, however, it seems to me, afford undoubted evidence that these tumors may undergo not only sarcomatous but probably carcinomatous degeneration, probably, however, only as the result of operative interference, and yet when we remember the very large number of cases of mucous polypi which are subject to exceedingly crude and harsh methods of removal, I think the statement may safely be made, that this tendency toward malignant degeneration is a somewhat feeble one. As far as I know, there is no well-established case in literature, of nasal polypus having undergone malignant degeneration spontaneously.

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<sup>1</sup> Loc. cit., p. 881.

<sup>2</sup> "Ueber die Transformation von Schleimpolypen in bösartige (krebsige oder sarcomatöse) Tumoren."

<sup>3</sup> "Tumeurs malignes, primitives du nez." *Revue mensuelle d'Otologie de Laryngologie et de Rhinologie*, 1885.



TREATMENT.—The successful treatment of mucous polypi in the nose depends upon their complete ablation, either by destruction or extirpation. The destruction of a polypus *in situ* has always been a subject of considerable interest, due undoubtedly, I think, to the very unsatisfactory results obtained from the use of surgical measures in vogue up to comparatively recent years. Local applications have the indorsement of good authority, for we find Bryant<sup>1</sup> representing that insufflations of powdered tannin possess a certain amount of efficacy, while better success is obtained from the local application of nitrate of silver in the hands of Nélaton.<sup>2</sup> Erichsen<sup>3</sup> cites a case, in which a large mucous polyp was destroyed by the injection of a strong solution of chloride of zinc. Robinson<sup>4</sup>

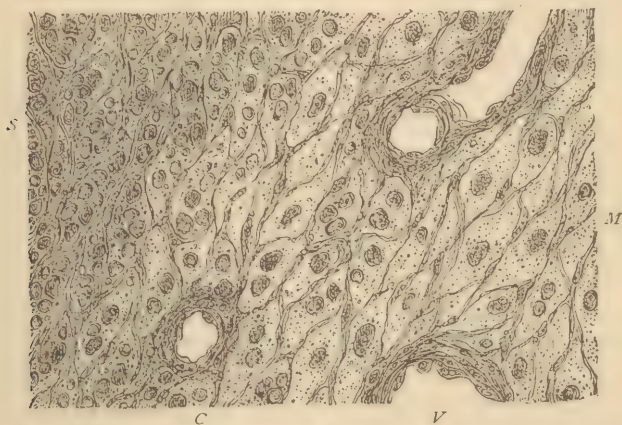


FIG. 107.—Myxoma, Changing to Myxo-Sarcoma. *M*, Myxomatous tissue; *S*, myxo-sarcomatous tissue; *V*, vein in transverse section; *C*, capillary in transverse section.

had good results from the use of tincture of chloride of iron. I seriously question, however, notwithstanding the weight of authority in their favor, whether any local applications to nasal polypi have any other than the most ephemeral action.

For their destruction certain chemical agents are recommended to be introduced directly into the mass, by means of a hypodermic syringe, or by simple puncture. Thus, Frank Donaldson<sup>5</sup> advises that chromic acid be carried directly into the body of the tumor by means of a pointed glass rod, while Bell<sup>6</sup> accomplished the same purpose, by injecting into each growth, by means of a hypodermic

<sup>1</sup> "Practice of Surgery," p. 552.

<sup>2</sup> "Pathologie Chirurgicale," Paris, 1874, 2d ed., vol. iii., p. 748.

<sup>3</sup> "Science and Art of Surgery," vol. ii., p. 386, Amer. ed., Phila. 1881.

<sup>4</sup> Op. cit., p. 259.

<sup>5</sup> Archives of Laryngology, vol. iv., p. 175.

<sup>6</sup> Canada Medical Review, February, 1884.

syringe, a solution of tannic acid, twenty grains to the ounce. In the same manner Maxwell<sup>1</sup> has met with success by the injection of tincture of iron. The destruction of a polyp *in situ*, after these methods, may undoubtedly be successful, but it results in a necrotic mass of tissue, which remains in the cavity, a putrid, offensive body, until it sloughs away. We can easily understand how, in those cases in which twenty, thirty, or even more separate growths occur, this method might involve an unnecessarily long and distressing course of treatment. I think it offers no advantage whatever, sufficient to warrant our subjecting patients to it. We reach the conclusion, then, that the only successful method of dealing with these growths is in their extirpation by surgical means. The evulsion of nasal polypi by means of forceps is certainly the oldest, and probably is the one which has come into widest use. Various forms of this instrument have been devised by different writers, all, however, agreeing in the same general characteristics. Thus, Erichsen<sup>2</sup> directs that, by means of the instrument itself, the location of the polyp is to be ascertained, when its pedicle is to be seized, and by a slightly rotary motion, twisted off. The same writer advises that the instrument should be long and of very slender construction. Perhaps the best instrument constructed on this principle is that of Simrock, in which the blade is toothed throughout the whole extent of its bite. Gross's duck-bill forceps, which are evidently designed to seize the growth itself, are altogether objectionable, on account of the size of the blades. A modification of this instrument has been devised by Mackenzie, which consists in fitting the blades to the handle at such an angle as to remove the hand below the line of vision in operating. The blade, furthermore, is fitted with a small ridge or punch, which, when approximating its fellow, inserts itself into a fenestra, thus forming a cutting instrument. This instrument is adapted for much nicer work than the ordinary forceps operation. A still more delicate instrument is the tube-forceps of Seiler<sup>3</sup> the shaft of which is made flexible, enabling the operator to carry it to any portion of the nasal cavity, the growth being seized by drawing the small blades within the tube. I think, however, in regard to the use of any forceps in the nasal cavity, that it is a procedure which should never under any circumstances be resorted to, unless absolute necessity exists, in the absence of any other of the many better devices. As regards special directions for searching for the polypus, and for seizing its pedicle, I am confident that no operator ever possessed either the skill to differentiate, by touch with the

<sup>1</sup> New York Med. Record, October 1st, 1868.

<sup>2</sup> "Science and Art of Surgery," Amer. ed., Phila., 1860.

<sup>3</sup> Op. cit., p. 269.

forceps, a nasal polypus from the mucous membrane, or sufficient manual dexterity to enable him to seize the pedicle. The instrument, at its best, cannot be sufficiently delicate to allow large freedom of action in the nose. As a rule, it will be carried in with its blades open, and then be closed upon whatever may happen to fall within its grasp. Furthermore, its use is often attended with an unnecessary injury of healthy tissue. We are told on good authority that this is not only justifiable, but oftentimes demanded, as for instance so careful a writer as Mackenzie, indorses the precaution frequently given by earlier writers, that a piece of the turbinated bone should be removed in operating on nasal polypi with the forceps, in order to prevent a recurrence of the growth. Now the origin of the tumor is not in the bone, but in the mucous membrane. Furthermore, when the whole of the growth is removed, in the large majority of cases the whole of the disease is extirpated. I know of no condition which either calls for or justifies the removal of a portion of the turbinated bone in a case of nasal polypi. Furthermore, operation by the forceps rarely results in a cure of the disease, but is rather followed by a recurrence of the growth, not only with increased activity, but with a neoplasm, as a rule, of a different character, in that it is more dense in structure, and contains largely of connective tissue, a result undoubtedly due to the harsh usage attendant upon the forceps operation. The essential feature of any operation for the extirpation of nasal polypi is that they shall be removed without injury to the healthy tissues. Now, for the accomplishment of this purpose I know of no measure comparable to the cold wire snare. In this instrument the loop of wire is slipped over the polypus, carried as far toward its base as possible, and then drawn within the tube, and the growth severed. For devising and rendering popular the cold snare *écraseur*, much credit is due to Dr. Jarvis,<sup>1</sup> who first made us familiar with the advantages of steel wire. Now, there is nothing new in the use of the snare, but a snare mounted with a steel wire is a very different instrument from one carrying annealed wire. The steel wire gives us a loop of sufficient stiffness to enable us to carry it to any portion of the nasal cavity, and over any growth which it is desired to seize. Jarvis's original snare *écraseur* (see Fig. 76) being somewhat slow in its action, led me to advise the instrument shown in Fig. 108, the manipulation of which will be readily appreciated at a single glance. The loop being placed in position over a growth, is drawn home by a single motion, and the tumor severed from its attachments.

The galvano-cautery, since its introduction by Middledorpf<sup>2</sup> and

<sup>1</sup> Archives of Laryngology, vol. ii., p. 164.

<sup>2</sup> "Die Galvanokaustic," Breslau, 1854.



its extended use by Voltolini,<sup>1</sup> has had many advocates for its use in the removal of these tumors. By this agent, a growth may be directly destroyed or its attachments severed by the galvano-caustic loop. This latter method, it is noticeable, was somewhat enthusiastically advocated by earlier writers notably Votolini,

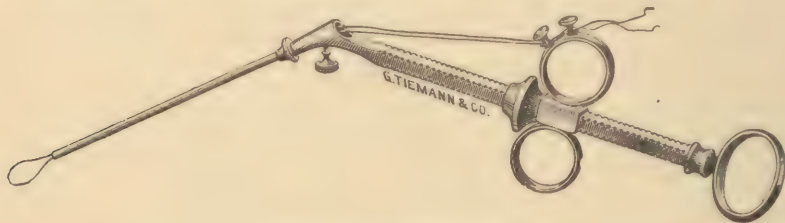


FIG. 108.—The Author's Snare.

Bruns, Michel, and especially Walston<sup>2</sup> of Edinburgh, who, however, uses the iron wire in place of the platinum. Of late years I think this device finds little if any indorsement, those who use the chemical cautery contenting themselves with making use of it to cauterize the base of a growth, after its removal by other methods, although not a few still make use of it for the destruction of the growth itself, notably Mackenzie,<sup>3</sup> who advises that a flat spatular electrode should be passed along the surface of the mucous membrane from which the polypus grows. As regards the galvano-cautery loop, all that it accomplishes is in the severing of the growth from its attachments, and it requires no little skill to put a soft and pliable platinum wire loop around a polypus, especially when it is mounted in the somewhat unwieldy cautery handle in common use (see Fig. 109). Furthermore, even when the loop is in position, I believe it a better procedure to separate the polyp by means of the wire alone, without turning on the electric current, as the heated wire only adds an element of danger to the operation, as causing more



FIG. 109.—Galvano-cautery Snare.

or less inflammatory reaction. As regards the destruction of the growth, as advocated by Mackenzie, it is necessarily a slow process, as mentioned by himself. Moreover it is not cleanly, and necessarily involves more or less of inflammatory reaction, and I am confident that were all clinical experiences with this instrument frankly

<sup>1</sup> "Die Galvanokaustik," Breslau, 1867.

<sup>2</sup> Report of British Med. Assoc., August, 1886.

<sup>3</sup> Op. cit., p. 374.

recorded, we should have many repetitions of the case reported by Daly,<sup>1</sup> where suppurative otitis with threatened mastoid disease followed the use of the potential cautery in the nose. I think we may safely say, then, of this agent that its advantages are few and its dangers and disadvantages many, hence, as we should naturally expect, we find it abandoned in favor of the cold wire snare by a large number of writers such as, Moure,<sup>2</sup> Lennox Browne,<sup>2</sup> Robinson,<sup>2</sup> Moldenhauer,<sup>2</sup> Schech,<sup>3</sup> and others. I do not hesitate, therefore, to say that the cold wire snare should be preferred, both as affording the most efficient and least painful method of operating, and also as more completely avoiding any dangers or complications that may arise, than any other device. The instrument already figured as the author's, possesses the advantage of delicacy of construction and ease of manipulation, while, at the same time,

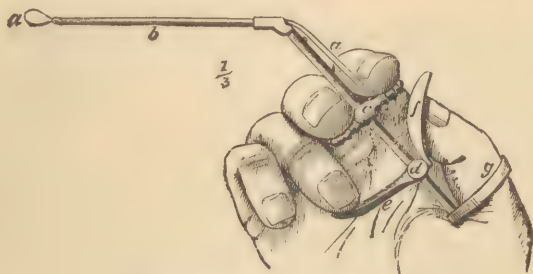


FIG. 110.—Mackenzie's Snare.

it affords an unobstructed view of the manipulation of the loop in the nasal cavity. The still further advantage, I think, should be mentioned, of the three-fingered manipulation, which undoubtedly affords the nicest adjustment of the loop over the growth, and the quickest abscission of the tumor, for it is properly a cutting instrument rather than a snare. Similar instruments have been devised by Schech,<sup>4</sup> Moldenhauer,<sup>5</sup> Mackenzie<sup>6</sup> (see Fig. 110), Sajous,<sup>7</sup> and Wright.<sup>8</sup> The latter instrument, however, is a somewhat heavier snare, and designed more especially for growths of denser structure. Its working is easily appreciated by reference to Fig. 111.

OPERATION.—In operating on nasal polypi, the use of cocaine is indispensable, both as producing local anæsthesia, and so far contracting the blood-vessels of the mucous membrane as to largely eliminate the possibility of hemorrhage. For this purpose, a

<sup>1</sup> Arch. of Laryngology, vol. ii., April 1st, 1881, p. 147.

<sup>2</sup> Op. cit.

<sup>3</sup> "Diseases of the Throat, Mouth, and Nose," English ed., Edinburgh, 1886.

<sup>4</sup> Op. cit., p. 267.

<sup>5</sup> Op. cit., p. 143.

<sup>6</sup> Op. cit., p. 271.

<sup>7</sup> "Diseases of the Nose and Throat," Phila., 1886, p. 142.

<sup>8</sup> N. Y. Med. Record, vol. xxxiii., March 17th, 1888, p. 315.

twenty-per-cent solution should be used as producing most rapid and complete insensibility. This should be applied by means of an atomizer. In cases where the cavities are more or less completely filled with the growths, the thorough anæsthetization of the membrane is impossible, although in those cases, much can be accomplished by the delicate manipulation of a pledget of cotton on a probe, dipped in the solution, and carried in as far as possible. Where a mucous polyp is visible, I think it in all cases feasible to carry a loop over it. Now, it is not a matter of importance whether the whole polyp is extirpated at the first operation or not. Bearing in mind, that, as a rule, its attachment is beneath the middle turbinated bone, the loop is carried in between the growth and the septum, its lower border being below the lower end of the tumor, when it should be turned to a horizontal plane and by a gentle to-

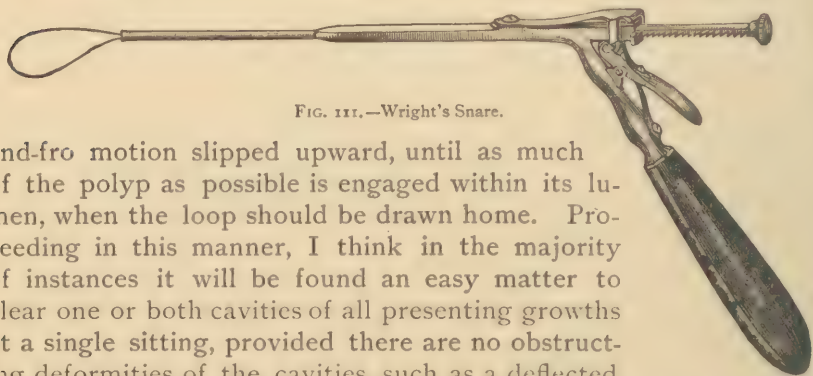


FIG. 111.—Wright's Snare.

and-fro motion slipped upward, until as much of the polyp as possible is engaged within its lumen, when the loop should be drawn home. Proceeding in this manner, I think in the majority of instances it will be found an easy matter to clear one or both cavities of all presenting growths at a single sitting, provided there are no obstructing deformities of the cavities, such as a deflected septum. If the polyps are numerous, and the cavity well filled, the complete inspection is much hampered by the profuse sero-mucous secretion, which seems to ooze from beneath the growths, and which it is necessary to constantly wipe away with pledgets of dry cotton. Hemorrhage rarely if ever attends this method of operating in the hands of a skilful manipulator, and therefore need not complicate the procedure, for the blood-supply in the polypus itself is exceedingly scanty, and the mucous membrane itself, the usual source of bleeding, need not be injured. As the operation proceeds, and deeper portions of the cavity are opened up, it is well to repeat the applications of cocaine, as, of course, much discomfort is saved the patient in anæsthetizing the free portion of the cavity, even if the anæsthetic does not reach completely the part filled by the growth. Where the tumor lies well back in the passage, and cannot be easily reached by the snare, although visible, the manipulation will be much aided by the use of McKay's slender ear forceps, shown in Fig. 112. By this instrument the growth can be easily



seized, its bite being mouse toothed, and drawn down into full view, when the loop can be readily adjusted over it. As before stated, it is usually quite feasible to thoroughly open up the passages by the removal of all visible polyps at one sitting. The removal of these growths, however, seems to loosen, as it were, those tumors which have been apparently crowded up in the sinuosities beneath the middle turbinated bone, so that they are enabled to drop down into the cavity. Hence, it is best to repeat the sitting at the end of a week, when oftentimes quite a number of apparently new growths will have shown themselves. These are not new polyps, however, but have simply allowed themselves to come into sight, and moreover have undoubtedly filled up and enlarged simply from the fact that space has been afforded them. These weekly sittings should be continued until an inspection shows a cavity entirely free



FIG. 112.—McKay's Forceps.

from polypi, after which the patient should be seen once a month for probably four or five months, at the end of which time a radical cure, in the large majority of cases, can be assured. Moure,<sup>1</sup> Schech,<sup>2</sup> Robinson,<sup>3</sup> and others, attach a certain amount of importance to the cauterization of the base of the growth, to prevent its recurrence, giving preference for this purpose to the galvano-cautery. I have never been able to recognize the base from which a polyp has been severed, and therefore think it unwise to subject healthy tissues to injury, in the blind attempt to cauterize a region that cannot be seen. Furthermore, I do not believe it is necessary, for as before intimated, if we thoroughly extirpate the growths they do not recur. Mackenzie<sup>4</sup> advises the ablation of the lamella of bone from which the polypus springs as "the most certain method of preventing any fresh development of the growth," and furthermore shows that this is necessary, in order to reach well up beneath the middle turbinated bone, a region otherwise inaccessible. Now, a polypus does not spring from the bone, and secondly I believe it perfectly feasible to carry the steel wire loop completely to the base of a growth, no matter how far it extends beneath the middle turbinated bone. The removal of bone or healthy mucous mem-

<sup>1</sup> Op. cit., p. 188.

<sup>3</sup> Op. cit., p. 265.

<sup>2</sup> Op. cit., p. 268.

<sup>4</sup> Op. cit., p. 370.

brane I think is never justifiable or necessary. The assertion that in a recurrence of these growths they take on a new development, in the fact of their being more dense and consisting largely of connective tissue, has already been referred to. Seiler,<sup>1</sup> in speaking of this change in development, notes also the fact that they assume a telangiectatic form. A similar observation has been made by Joaquin Berruoco.<sup>2</sup> In a large number of cases which I have followed, some as the result of neglect and failure of attendance, extending through two and three and even four years, I have in no single instance observed any such tendency, after operating with the cold snare, the polypus at the end of four years showing the same type as the original virgin growth. I am confident that this fibrous development is entirely the result of traumatism in the use of forceps or the galvano-cautery, as every case which has come under my observation which had been subjected to these harsh measures, showed marked evidence of this change, in the denser character of the tumors, and in the fact of their bleeding freely upon removal. I make this assertion broadly, for it is based on a large experience, in which no single exception to the rule has been observed. In closing, mention should be made of the use of electrolysis for the ablation of nasal polypi, as alluded to by Sajous<sup>3</sup> and Robinson.<sup>4</sup> In this procedure, the positive pole of the battery is attached to a needle which is inserted into the polypus, while the negative pole is attached to a sponge-electrode placed over the nose, the current being allowed to pass for about fifteen minutes, the sitting being repeated every three or four days. This is a somewhat unnecessarily tedious procedure, and as shown by Berruoco,<sup>5</sup> is only applicable to the smallest growths.

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<sup>1</sup> Op. cit., p. 265.

<sup>2</sup> *Anales de otologia y laryngologia*, No. 3, 1887.

<sup>3</sup> Op. cit., p. 146.

<sup>4</sup> Op. cit., p. 266.

<sup>5</sup> Loc. cit.

## CHAPTER XXIX.

### FIBROMA OF THE NASAL PASSAGES.

A CURSORY examination of the literature of nasal growths, would seem to suggest that a fibrous tumor in the nasal cavity is an exceedingly rare event. Thus Mackenzie's<sup>1</sup> study of the subject is based on an analysis of three cases, one of which occurred in his own practice. A more careful investigation, however, shows us, that whereas this form of neoplasm is met with more frequently in the naso-pharynx than in any other portion of the upper air-passages, its location in the nasal cavity proper is by no means an uncommon occurrence. Moreover, the establishment of this fact is not in any way due to the development of an interest in diseases of the upper air-passages, because a majority of the cases found in literature, were reported long before the diseases of the nasal cavity became the subject of that industrious investigation, which characterizes the present day. Thus, we find reports on the subject by Syme,<sup>2</sup> Mott,<sup>3</sup> Gerdy,<sup>4</sup> Figuière,<sup>5</sup> Verhaeghe,<sup>6</sup> Gomez,<sup>7</sup> Syme,<sup>8</sup> Pepinster,<sup>9</sup> Fisher,<sup>10</sup> Van Dommelen,<sup>11</sup> Mougins,<sup>12</sup> Fischer,<sup>13</sup> Dickson,<sup>14</sup> Dol-

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<sup>1</sup> "Diseases of the Throat and Nose," American Edition, Philadelphia, 1884, vol. ii., p. 375.

<sup>2</sup> Edinburgh Med. and Surg. Journ., 1832, vol. xxxviii., pp. 322 to 324.

<sup>3</sup> Am. Journ. of Med. Sciences, 1843, n. s., vol. v., pp. 87-91.

<sup>4</sup> "Des Polypes et de leur Traitement," Paris, 1833, p. 19.

<sup>5</sup> Bull. de la Soc. Anat. de Paris, 1843, vol. xviii., p. 294.

<sup>6</sup> Annal. Soc. méd-chir. de Bruges, 1844, 214-217.

<sup>7</sup> Gac. Med., Madrid, 1850, vol. vi., p. 272.

<sup>8</sup> Monthly Journ. of Med. Sciences, 1852, vol. xv., p. 274.

<sup>9</sup> Arch. Belges de Méd. Mil., Bruxelles, 1856, vol. xvii., p. 342.

<sup>10</sup> Am. Med. Monthly, 1857, vol. viii., p. 15.

<sup>11</sup> Jour. des Connaissances Méd. Prat. et Pharm., 1858-9, vol. xxvi., p. 425. (Though the history of this case would lead to the suspicion, that it may have been a gummatous tumor of the lower turbinated bone.)

<sup>12</sup> Revue de Thérapeutique Méd-Chir., Paris, 1861, p. 621.

<sup>13</sup> Mith. aus der Chirurg. Univ. Klin. zu Göttingen, 1861, p. 290.

<sup>14</sup> Brit. Am. Journ., 1861, vol. ii., p. 545.



beau,<sup>1</sup> Bryk,<sup>2</sup> Maisonneuve,<sup>3</sup> Hodgen,<sup>4</sup> Steiner,<sup>5</sup> Smith,<sup>6</sup> Hitchcock,<sup>7</sup> Lichtenberg,<sup>8</sup> Perez y Jimenez,<sup>9</sup> Gay,<sup>10</sup> Kempf,<sup>11</sup> Jarvis,<sup>12</sup> Chiari,<sup>13</sup> Buchanan,<sup>14</sup> Cozzolino,<sup>15</sup> Jacquemart,<sup>16</sup> Seiler,<sup>17</sup> Chatellier,<sup>18</sup> Villar,<sup>19</sup> Kirtikar,<sup>20</sup> Casselberry,<sup>21</sup> and Ingals,<sup>22</sup> the whole embracing a study of 41 cases of the disease.

ETIOLOGY.—Morbid processes in the nasal mucous membrane are essentially those which involve connective-tissue changes, hence the highly vascular character of the pituitary membrane, together with the intense functional activity which belongs to it, would seem to provide especially favorable conditions for the development of fibromata. It is a well-known fact, that the uterus is the most frequent site of fibroid development, which Billroth<sup>23</sup> very ingeniously explains, on the theory that fibromata arise from the nerve sheaths, and the adventitia of the small arteries, the nerves disappearing, while the arteries remain, and hence the uterus, whose nerves and vessels undergo such great changes during menstruation and pregnancy, offers a favorable site for this form of morbid growth. The daily and hourly changes in the turgescence of the blood-vessels of the nasal membrane, together with its exceedingly rich nerve distribution, would seem to show the existence of a certain predisposing cause of the disease under consideration in this region also. The immediately exciting cause, however, is not so easily explained, although in Steiner's case, an inflammatory process seems to have been the active cause of the morbid growth, while in Buchanan's

<sup>1</sup> *Gaz. des Hôpitaux*, 1862, vol. xxxv., p. 530.

<sup>2</sup> *Wien. Med. Halle*, 1862, pp. 223 et 276.

<sup>3</sup> *Gaz. des Hôpitaux*, 1863, vol. xxxvi., p. 521.

<sup>4</sup> *St. Louis Med. and Surg. Journ.*, 1865, vol. ii., p. 97.

<sup>5</sup> *Wien. Med. Woch.*, 1868, vol. xviii., p. 1082.

<sup>6</sup> *Brit. Med. Journ.*, 1869, vol. ii., p. 557.

<sup>7</sup> *Trans. Med. Soc. Mich.* (1870), Lansing, 1871, p. 94.

<sup>8</sup> *Lancet*, 1872, vol. ii., p. 773.

<sup>9</sup> *Génio. Med. Quir., Mad.*, 1875, vol. xxi., p. 346.

<sup>10</sup> *Buffalo Med. and Surg. Journ.*, 1875-6, vol. xv., p. 301.

<sup>11</sup> *Louisville Med. News*, 1879, vol. vii., p. 65.

<sup>12</sup> *Med. Record*, New York, Sept. 2d, 1882, vol. xxii., p. 270.

<sup>13</sup> *Wien. Med. Jahrbuch*, 1882, p. 481.

<sup>14</sup> *Glasgow Med. Journ.*, 1882, vol. xvii., p. 211.

<sup>15</sup> *Archivii Ital. di Laryngol.*, 1883-84, Number iii., p. 97.

<sup>16</sup> *Annal. des Mal. de l'Oreille*, May, 1883, p. 69.

<sup>17</sup> *Trans. Pathological Society of Philadelphia*, 1884, vol. xi., p. 126.

<sup>18</sup> *Annal. des Mal. de l'Oreille*, 1886, vol. xii., p. 473.

<sup>19</sup> *La France Médicale*, 1886, vol. i., p. 374.

<sup>20</sup> *Transactions of the Medical and Physical Society. Bombay* (1886), 1887, (III.) S.,

x., p. 59.

<sup>21</sup> *Journ. Am. Med. Ass'n*, April 21st, 1888.

<sup>22</sup> *Journ. Am. Med. Ass'n*, Chicago, Dec. 8th, 1888, p. 803.

<sup>23</sup> *Langenbeck's Arch.*, vol. iv., p. 545.

case, the development seems to have been due to traumatism. In the negro races, as we know, fibroma of the uterus is exceedingly common. As regards the nasal cavity, however, race would seem to have no influence. Sex, on the other hand, would seem to have a notable influence in predisposing to the disease, in that rather more than two-thirds of the cases reported occurred in males. Age would seem to exercise a certain influence also, in that the disease belongs to the earlier periods of life, usually from fifteen to thirty, the youngest case being that of Gerdy, at 13, while the oldest case, Seiler's, occurred at the age of 68, Gomez's case being 60, while Kempf's was 58.

**SYMPTOMATOLOGY.**—As already noted, the disease probably commences in the nerve sheaths and blood-vessels, the nerves being destroyed, while the vessels remain. Moreover, in this region, the disease develops in the sheaths of the vaso-motor nerves. Hence, pain is rarely a symptom in the early part of the disease, although it may develop later, as the result of pressure. It is never, however, a prominent symptom. Epistaxis, on the other hand, is perhaps one of the most constant and frequent evidences of the disease, due in most instances, undoubtedly, to the vascularity of the growth itself, the surface of the tumor becoming eroded, although this erosion may occur in the mucous membrane lining the nasal cavity, giving rise to hemorrhage from this source. In the large majority of instances, however, the source of the bleeding is in the tumor itself. This symptom recurs with considerable frequency, and may become an exceedingly grave symptom, on account of its persistency, and frequent occurrence. Nasal stenosis, with a more or less profuse muco-purulent discharge mixed with blood or clots, is of course a frequent attendant upon the development of these growths. Nasal stenosis is present, according to the size and location of the growth. Perhaps no form of neoplasm develops and spreads with a more unrelenting progress than a fibroma, neither tissue, cartilage, nor bone seems to offer the slightest hindrance to its growth. Hence, according to its original location, and the direction of its growth, external deformity sooner or later develops. This, however, is not present in all cases, in that in certain instances, where it makes its exit either from the nostril or through the posterior nares, it would seem to expend its force in these directions. In most cases, it has its origin in the roof or upper portion of the nasal cavity, and hence, extending forward, it gives rise to the peculiar facial expression which we call frog face, which consists of a spreading of the nasal bones, with an apparent flattening of its ridge. In Steiner's, Maisonneuve's, Dolbeau's, and Seiler's cases, exophthalmos was produced, by the growth obliterating the eth-

moid or sphenoid sinuses, and encroaching upon the orbital cavity. In Hitchcock's case, the antrum on one side was obliterated by encroachment of the growth, while on the other side, the same obliteration occurred by the septum being crowded and pressed against it. Headache seems to have been present in a number of these cases, probably of a neuralgic character. Anosmia occurs in the majority of instances, as the direct result of stenosis, while, as its indirect result, slight impairment of hearing is present in all cases, and in many, this symptom is very prominent, due probably to the interference with normal nasal respiration, although, if the growth extends into the naso-pharynx, there may be direct pressure upon the orifice of the Eustachian tube, while, as the result of this extension, the movements of the pharynx in deglutition may be seriously interfered with.

**PATHOLOGY.**—Fibroma of the nose, from a pathological point of view, differs in none of its essential features from the same form of neoplasm as found in other regions of the body. It is composed of a dense network of fibrous tissue, containing within the meshes or interspaces, scattered here and there, either between the bundles of fibres, or between individual fibres, spindle-shaped or stellate cells, together with a finely granular homogenous basement substance. The density of the tumor varies to a certain extent, dependent somewhat on the relative proportion of the cellular substance, and the fibrous tissue. Thus, in Dolbeau's case, in certain portions of the tumor, the fibro-plastic elements were even in excess of the fibrous tissue. In connection with the white fibrous tissue, a few yellow elastic fibres may be found. The starting-point of the growth, as Billroth<sup>1</sup> has shown, is in the nerve sheaths and adventitia of the small arteries. As the tumor develops, the nerves are destroyed, while the arteries remain intact. This observation is supported by clinical experience, as regards a nasal fibroma, in that while the growth of the tumor is not attended with pain, it is highly vascular, its progress being attended by repeated attacks of epistaxis, while the operations for its removal are attended with excessive hemorrhage. In this respect, the nasal neoplasm differs in a notable degree from the same form of growth in other portions of the body.

Sarcomatous degeneration is a not infrequent occurrence in these cases, and yet the presence of spindle cells is not always to be regarded as an evidence of this change, in that this element may persist for a long period of time, and even increase, and yet the growth itself, from a clinical point of view, show no evidence whatever of malignancy. Thus, Ingals<sup>1</sup> operated on a pure fibroma,

<sup>1</sup> Loc. cit.



which recurred at the end of five years. The tissue removed by the second operation proved to be in part composed of from one-fifth to one-half cellular elements.

In making a microscopic examination, it is a matter of some importance, that a number of specimens be studied, in order to establish the definite relation between the fibrous and the cellular elements, as these growths may not only undergo sarcomatous degeneration, but there may be a mixed growth from the onset. Aside from sarcoma, we have fibrous tissue combined with other elements, giving rise to a myxo-fibroma, adeno-fibroma, chondro-fibroma and osteo-fibroma. Of these forms, myxo-fibroma is not infrequently met with in the nose. Probably, in most cases, this growth is the result of harsh surgical measures, for the relief of simple myxoma. Dixon's case, as far as I know, is the only instance on record of a chondro-fibroma. Of the other varieties, no cases have been reported as occurring in the nasal cavity.

DIAGNOSIS.—With our present means of exploring the nasal passages, by depleting the blood-vessels through the action of cocaine, a fibroma whose origin is in the nasal cavity proper, should ordinarily be brought under ocular inspection through the anterior nares, even when situated well back in the chambers, if the secretions be deftly removed, by means of a cotton pledget, and the parts thoroughly cleansed. If this is not feasible, it can be brought under inspection, by means of a rhinoscopic mirror in the fauces. When seen, its gross appearance is characteristic, and usually recognized with facility. The surface of the growth is irregularly rounded or lobulated, smooth and glistening in appearance, and presents a decidedly reddish-pink color. In some cases, the blood-vessels can be recognized coursing near its surface, being thrown into somewhat prominent relief, by the whitish background of the fibrous tissue of which the tumor is composed. These growths are usually sessile in character, and firmly imbedded, as it were, in the cavity, and do not yield on pressure with the probe. In other cases, a to-and-fro motion to the touch can be observed, as showing that the tumor is somewhat pedunculated, as occurred in Pepinster's case. As before stated, the growth of a fibroma is relentless, in that it appears to crowd all tissue before it, and yet its shape is, to an extent, modified by the shape of the bony cavity, so that it seems to send prolongations forward toward the anterior nares, or backward into the pharynx. The growth is of a dense, resisting character, and need not usually be mistaken for any other neoplasm, the diagnosis being based on the subjective symptoms of stenosis, and much aided by external deformity, where it exists, together with the repeated attacks of epistaxis, which are characteristic, and the peculiar color, and gross appearance.

The only neoplasms in the nose with which it might be confounded, are osteoma or chondroma. Osteoma is exceedingly rare in this region, usually arising from the accessory sinuses, and should be recognized by the probe or needle. Chondroma is even rarer than osteoma, and its recognition will be dependent, either on the use of the needle, or the removal of a piece for microscopic examination. While the diagnosis of the character of the growth is quite easy, the determination of its origin requires a more careful examination. It is a matter of no little importance, to determine whether the growth springs from the nasal cavity proper, or from the vault of the pharynx, for, as we have seen, nasal fibromata are comparatively rare, while the upper pharynx is a somewhat frequent site for their development, the operative procedure indicated in the one case, being very different from that in the other. A pharyngeal fibroma usually gives rise to bilateral stenosis, while in its early stage, and usually till the tumor has grown to considerable size, a nasal fibroma causes unilateral stenosis. Dolbeau<sup>1</sup> seems to attach considerable importance to this diagnostic symptom, but takes the ground, that the unilateral stenosis characterizes the naso-pharyngeal growth. I am disposed to think, however, that a tumor springing from the base of the skull will give rise to obstruction of both posterior nares, as it grows downward, forming a curtain, as it were, much earlier than the nasal tumor having its origin in one passage. Furthermore, the peculiar frog-face already mentioned, is a characteristic of the nasal growth, a feature usually not so prominent in the pharyngeal disease. The determination, then, of the site, must be based on such careful study of the parts as the size of the growth permits, both by rhinoscopic examination, and palpation, together with the use of the probe, in connection with a careful estimate of the subjective symptoms. In the majority of cases, the growth springs from the upper portion of the cavity, either from the ethmoid bone, or from the region of the superior turbinated, although in Dixon's, Pepinster's, and one of Ingals's cases, its origin was in the floor of the nares, while in Fischer's and Dolbeau's cases, it sprang from the septum.

PROGNOSIS.—On account of its location, and its nearness to vital parts, a fibroma of the nose will eventually prove fatal, unless subjected to successful operative interference. That, however, a favorable termination may be expected from this interference, is very strikingly shown, by the results of the cases above alluded to, in that of those in which the full details are given, we find that in twenty-three, the growth was successfully extirpated, while in four, death occurred, in all cases as the result of the operation, for in

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<sup>1</sup> Loc. cit.

Gerdy's and Seiler's cases, death occurred on the operating-table, while in Syme's and Dolbeau's cases, death occurred respectively in a day and a half, and five days after operation, and apparently as the result of it. Gerdy's and Syme's cases were boys of thirteen and fifteen years of age, in which the disease had lasted respectively eighteen and twelve months, while in Dolbeau's case the disease had lasted for twelve years, in a man of forty-one years of age, probably having produced notable impairment of general health. In Seiler's case also, the disease had existed for a number of years, in a man aged sixty-eight, rendering him probably an unfavorable case for operation.

TREATMENT.—No local treatment has ever been demonstrated to possess any power whatever in arresting the growth of these tumors, unless, perhaps, we except electrolysis, used successfully in Ingal's hands, in notably reducing the size of the growth in one of his cases, thus enabling him to use the *écraseur* with more facility, by which he completed his operation. Used in this manner, and for this purpose, electrolysis might prove an exceedingly valuable measure. Whether the size of the larger tumors can be modified in this way, or whether any growth can be fully eradicated, still remains to be demonstrated. Certainly, in the majority of instances, a surgical operation for the removal of the tumor is indicated, and will be required. If the growth can be embraced in the loop of a cold wire snare, or the galvano-cautery *écraseur*, probably we possess no better method for its removal, and with our present improved methods of working in the nasal cavity, and also with the great advantages of the use of cocaine, this is far more feasible than in former times. The choice of the cold or the heated wire, of course, will be dictated largely by the individual preferences of the operator. The steel wire, however, owing to its resistance, and facility of manipulation, certainly affords a device, by which a loop can be placed around a growth with far greater facility than the platinum wire of the galvano-cautery. After the wire is in position, it becomes a question, whether the simple *écraseur* will not accomplish all that the cautery does, without subjecting the patient to the inflammatory reaction, which usually follows the use of the potential cautery, in that when the loop is slowly contracted, hemorrhage is completely avoided; thus, in Jarvis's case, five hours were consumed in closing the loop. It has been almost the universal practice, to use the No. 5 steel piano wire in the snare. It certainly would be wiser, in fibroma of the nose, to make use of the larger sizes, in order to avoid the possibility of any accident happening, as did in Seiler's case, by the breaking of the wire. If the growth is of large size, there is no objection to



removing it piecemeal, if this is feasible. Where, however, this cannot be done, Casselberry's device can be resorted to, which consists in incising the growth by means of the galvano-cautery knife, after which, the snare can be easily adjusted over the two tongues, as it were, which are thus produced. In Smith's, Gay's and Gomez's cases, evulsion was practised, and apparently with success, but it is a method of operation, which would scarcely be considered a proper surgical procedure at the present day. In many cases, however, one of the operations alluded to in the chapter on the External Surgery of the Nose, will be necessary. In Fisher's case, the soft palate was slit, and the growth dragged down, and cut with a knife, while in Dolbeau's, access to the cavity was obtained, by opening through both the soft and hard palate; this latter procedure, however, was resorted to through a mistaken idea that the growth was naso-pharyngeal.

The great danger which attends an operation on a nasal fibroma, lies in the excessive hemorrhage. Thus, in both Gerdy's and Seiler's cases, this was the cause of death, which occurred on the operating table. We possess no means of eliminating this danger, as it is a concomitant of this form of tumor, and must be managed by the rules which govern general surgical procedure.

## CHAPTER XXX

### • OSTEOMA OF THE NASAL PASSAGES.

MANY writers classify osteomata as exostoses and enostoses, a distinction which, from a clinical point of view, I think best to be discarded, as regards the nasal cavity. A careful reading of the reports of cases of exostoses, warrants the conclusion, that this term is used to describe that form of outgrowth, so frequently met with at the sutural junction, between the vomer and the palatal process of the superior maxilla, already described in the chapter on deformities of the septum, and which are not to be regarded as osteomata properly. The term osteoma, then, we should restrict to that very grave form of osseous neoplasm, which, having its origin in the upper portion of the nasal cavity, or in one of the accessory sinuses, extends slowly, but with a relentless progress which nothing withstands, until it invades neighboring parts, or projects beyond the cavity, producing oftentimes most unsightly external deformity. In most cases, these tumors, in their development, retain connection with the parts from which they originate, constituting what are ordinarily called, living osteomata. In other cases, this connection may be severed, as the result of a blow, or some unknown cause, and the fragment remain imprisoned in the cavity, as a source of irritation, constituting what is known as a dead osteoma.

While it is not an especially rare occurrence, for the nasal cavity to be invaded by an osseous tumor, which has its origin in parts beyond, a neoplasm of this form, developing primarily in this region, is much less frequent. Their occurrence is evidenced by such unmistakable signs, that we can easily understand how they should have been recognized by the earliest writers on medicine, and yet their observations were so lacking in definite data, as to add little to our clinical knowledge of the disease. For this, we must depend largely on the observations of later date. Thus we have reports by Morgan,<sup>1</sup> Hilton,<sup>2</sup> Duka,<sup>3</sup> Michon,<sup>4</sup> Verneuil,<sup>5</sup>

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<sup>1</sup> Guy's Hospital Reports, 1836, vol. i., p. 403.

<sup>2</sup> Ibid., p. 493.

<sup>3</sup> Path. Trans., London, vol. xvii., p. 256.

<sup>4</sup> Bul. de la Soc. de Chir. de Paris, Séance Jan. 9th, 1850, vol. i., p. 505.

<sup>5</sup> Comptes Rendus de la Soc. de Biol., 1851, p. 80.

Mott,<sup>1</sup> Legouest,<sup>2</sup> Pamard,<sup>3</sup> Ollivier,<sup>4</sup> Gaubert,<sup>5</sup> Rendu,<sup>6</sup> Richet,<sup>7</sup> Dolbeau,<sup>8</sup> Arnold,<sup>9</sup> Michel,<sup>10</sup> Knapp,<sup>11</sup> Bornhaupt,<sup>12</sup> Habermaas,<sup>13</sup> Knapp,<sup>14</sup> Tillmanns,<sup>15</sup> Sprengle,<sup>16</sup> and Fenger.<sup>17</sup>

ETIOLOGY.—It is difficult to assign any direct cause for these growths, and any suggestion would be merely speculative. They ordinarily commence somewhat early in life, usually at from fifteen to twenty, although Tillmanns's case manifested its first symptom at the age of forty-five. In the majority of instances they occur in males, although why this should be, it is difficult to say. In six of the cases collected by Bornhaupt, as well as in Fenger's case, a clinical history of an injury was obtained, although neither of these writers seems to think that this exerted any direct causative influence upon the development of the growth.

SYMPTOMATOLOGY.—External deformity seems to be the earliest symptom to which these growths give rise, in the majority of cases this feature presenting, even before nasal stenosis is recognized. This is due to the fact, that the growth has its origin in the upper portion of the nasal cavity, and extends toward the face, even before it involves the lower meatus. Thus in Morgan's case, after a duration of nine years, the tumor seemed to cover the whole of one side of the face, causing a most unsightly deformity. In the same way, it very early shows a disposition to invade neighboring cavities, its most frequent track, perhaps, being through the ethmoid cells to the orbit, giving rise to exophthalmos, as occurred in Hilton's, Fenger's, Mott's and Tillmanns's cases. Epistaxis does not usually occur. Pain, however, due to pressure on some of the sensory nerves, is of frequent occurrence. Nasal stenosis is of course dependent upon the size and direction which the growth

<sup>1</sup> Am. Journ. of Med. Sciences, 1857, p. 35.

<sup>2</sup> Gaz. Heb., 1863, vol. x., p. 854.

<sup>3</sup> Bull. de la Soc. de Chir., 1866.

<sup>4</sup> Thèse de Paris, 1869.

<sup>5</sup> Thèse de Paris, 1869.

<sup>6</sup> Arch. Générale de Méd., August, 1870, ii., 214.

<sup>7</sup> Bull. de l'Acad. de Méd., Paris, 1871, vol. xxxvi., p. 564.

<sup>8</sup> Bull. de la Soc. de Chir., Paris, 1872, p. 5; Bull. de l'Acad. de Méd., 1866, vol. xxxi.,

p. 1,076.

<sup>9</sup> Virchow's Archiv, Bd. lvii., p. 145.

<sup>10</sup> Gaz. Heb., 1873, 2 s., vol. x., p. 380.

<sup>11</sup> Archives of Ophthalmol., 1880, vol., ix., p. 464.

<sup>12</sup> Langenbeck's Arch., 1881, Bd. xxvi, p. 589.

<sup>13</sup> "Mittheilungen aus der Chirurg. Klinik zu Tübingen," herausgeg. von Paul Bruns Tübingen, 1884, S. 376.

<sup>14</sup> Archives of Otology, 1884, vol. xiii., p. 51.

<sup>15</sup> Verhandlungen der Deutschen Gesellschaft für Chirurgie, Berlin, 1885, p. 72.

<sup>16</sup> Arch. für Klin. Chir., Bd. 35, H. 1, 1887, p. 224.

<sup>17</sup> Journ. Amer. Med. Ass., August 11th, 1888, p. 185.



takes. Discharge from the nose is not usually a prominent symptom, although suppuration, as the result of ulcerative processes, or death of the osteoma, occasionally occurs. In both Tillmanns's and Fenger's cases, there was an external fistula, due probably to bony necrosis, as the result of pressure by the neoplasm.

**PATHOLOGY.**—These tumors are met with in two varieties, the hard and soft. In one case the growth being made up entirely of compact tissue, while in the other it is made up of cancellous tissue, covered by a thin shell, as it were, of hard bone. The starting-point of the morbid process in these tumors is still somewhat a matter of speculation. They may arise from the ossification of the islands of cartilage, which are occasionally found as survivals of the original process, by which the bones of the skull are formed; or their starting-point may be in the minute centres of calcification, which Verneuil has demonstrated to exist in the mucous membrane. Whichever of these theories may be true, the source of these growths is undoubtedly in the periosteum. There is good ground for supposing that their primary origin is always in one of the accessory sinuses. Thus, Tillmanns thinks, that in the large majority of instances they have their origin in the ethmoidal cells. This is confirmed by Bornhaupt, who, in an investigation of forty-nine cases of osteoma of the nose and accessory cavities, finds this origin in thirty-four cases. In Legouest's and Richet's cases, the tumor developed from the inferior turbinated bones, while Michel's sprang from the septum. We must, then, accept Dolbeau's view, that they may arise from any portion of the mucous membrane, either of the nose or accessory cavities; their frequency in the accessory cavities, and especially in the ethmoid, being closely connected with the peculiar tendency to calcareous degeneration alluded to in the discussion of the pathology of disease of the antrum.

The surface of these tumors is irregularly lobulated, and covered with normal mucous membrane, the deep layer of which forms the periosteum. The outer layer of the tumor is invariably formed of compact bone tissue, differing in no essential degree from normal bone of this character. In many cases, the entire tumor is composed of this tissue, while in others, as we penetrate beneath the surface, we come upon the cancellous tissue, still preserving the normal type, and differing from it only in that the Haversian systems are somewhat distorted, and perhaps, in most instances, crowded together, as it were, into a denser tissue than the normal. At its onset, the development of these tumors is equal and peripheral, giving rise to a cylindrical and rounded contour. As they impinge upon the bony walls of the cavity, this rounded shape is in-

terfered with in such a way, that the surface becomes nodulated, and furthermore, prolongations develop in the direction in which their progress is least impeded, as in Legouest's case, one prolongation extended well back into the pharynx, while another presented near the nostril, while in Duka's case, the prolongations were respectively toward the anterior nares and the antrum. As the tumor develops, the point of original attachment occupies an area which bears a somewhat small relation to the whole size of the growth. Now, when we remember that the pedicle is composed of spongy tissue, it is easy to understand, how a spontaneous separation may occur at this point, giving rise to a dead osteoma. This separation may occur in one of two ways. The growth may be broken off, as the result of traumatism, or, as Tillmanns suggests, it may occur from a process of atrophy, due to pressure at the point of attachment, giving rise to suppuration and ultimate necrosis; or, if the tumor has attained a large size, and still depends for nutrition upon a comparatively small pedicle, it may not be impossible, that the separation may occur as the result of interference with free circulation through the nutrient arteries.

DIAGNOSIS.—The existence of the growth is recognized, primarily, by the interference with normal nasal respiration, which, calling for an examination of the parts, should enable us to recognize the existence of the tumor at a comparatively early stage, when its character should be made manifest by its gross appearances, and the resisting surface; the presence of bone, probably in every case, being easily determined, by means of the probe, or, where feasible, the insertion of the finger. If there be any doubt as to its structure, the exploring-needle is sufficient to remove this. The nicer points of diagnosis, such as between an osteoma and an osteo-sarcoma, can only be determined by the removal of a portion of the tumor, and subjecting it to a microscopical examination. The growth is firm and absolutely immovable, except in those cases where spontaneous separation has occurred, hence its mobility must always be accepted as evidence of this occurrence. If the tumor has remained in the cavity for a prolonged period of time after separation, it may present the appearance of a rhinolith, in that its mucous membrane undoubtedly will have sloughed away, and its presence be attended with a profuse and offensive discharge. In this case, the diagnosis would only be cleared, after the removal of the growth.

PROGNOSIS.—After spontaneous separation, there is no tendency to recurrence, the only condition to deal with, being the removal of what is now merely a foreign body in the nose. Where this fortunate accident does not occur, these growths may attain large

size, and involve very serious external facial deformity, and yet the prognosis seems to be favorable in the very large majority of cases, in that surgical interference is usually attended with complete success.

TREATMENT.—In most instances, the usual difficulty which the treatment of these growths involves, is found in those cases in which the tumors are of the hard variety, and of considerable size, owing to the fact that the density of the growth is in many cases so great as to resist any form of instrument used for either crushing or cutting. Hence the object must be, to obtain access to the pedicle, which, as before stated, being of cancellous structure, is easily cut through, when reached. An external operation in most instances therefore will be required, the special features of which will be determined largely by the form and size of the tumor. This will often demand free incisions, and the extensive removal of such bony structures as may stand in the way of free access to the pedicle. When this is reached, the separation is easily accomplished by means of the chisel, crushing forceps, or the saw. The only serious accident that may occur, in connection with the operation, is excessive hemorrhage, which is fortunately somewhat rare, although, in one of Dolbeau's operations, this was of a most alarming character.



## CHAPTER XXXI.

### PAPILLOMA OF THE NASAL PASSAGES.

PAPILLOMATA or warty growths, as affecting mucous membranes in general, would seem to find, certainly, a predisposing cause in the movements to which the part is subjected by its normal functional activity; hence the nasal cavity, protected as it is to a large extent by its bony walls, and endowed with certain functions which are carried on in a state of absolute quiescence, we should naturally infer, would be to a large extent exempt from the invasion of this form of neoplasm, a fact which clinical observation fully confirms; for, I take it, that a certain allowance is to be made for the enthusiasm manifested by Hopmann<sup>1</sup> in the study of these growths, which he was the first to investigate, when he finds seventy-eight cases of papillomata, in a total of four hundred and thirty cases of benign nasal tumors. In a later paper, Hopmann<sup>2</sup> states that Schäffer, in one hundred and eighty-two cases of nasal polypi, observed twenty instances of papillomata. Schmiegelow,<sup>3</sup> on the other hand, in seventeen cases of nasal tumors, found but one case, while Zuckerkandl<sup>4</sup> observed only one case of papilloma in thirty-nine cases of polypi. It is certainly not easy to harmonize these observations of Hopmann and Schäffer with ordinary clinical experience, unless we recognize the fact that these growths are, in the large majority of instances, entirely overlooked. My own records include something over two hundred cases of benign tumors of the nose, but one of which was a case of papilloma, that of a girl aged thirteen, in which a growth, the size of a raspberry, springing from the lower turbinated body in front, was removed by means of the snare, without recurrence; there was no other morbid condition. The only conclusion then to be drawn is, that we have been in the habit of overlooking these cases, for when we consider the thoroughly exhaustive and scholarly manner in which Hopmann has written up the subject, I take it we

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<sup>1</sup> Virchow's Archiv, vol. xciii., Sammlung Klinischer Vorträge, No. 315.

<sup>2</sup> Wien. Med. Presse, 1883, xxiv., 1227-31.

<sup>3</sup> Hospitalstidende, Marto, 1885.

<sup>4</sup> "Anatomie der Nasenhöhle," Wien, 1882, p. 70.

are not at liberty to question his results, to which still further weight is given by the subsequent observations of Mackenize,<sup>1</sup> Butlin,<sup>2</sup> Aysaguer,<sup>3</sup> Verneuil,<sup>4</sup> Cozzolino,<sup>5</sup> Gamperz<sup>6</sup> and Noquet.<sup>7</sup> Besides these cases, published after the first of Hopmann's elaborate articles, researches in literature afford us two other examples of what were in all probability instances of this disease. Thus, Ward<sup>8</sup> reports a case of follicular tumor of the nose, which was probably a papilloma; and the same can be said of the case reported by Testelin,<sup>9</sup> as a condylomatous polyp of the nasal fossa.

ETIOLOGY.—It is not easy to assign any definite cause for the occurrence of this form of neoplasm in the nose. Hopmann gives prominence to atrophic rhinitis as exciting their growth, a pathological condition, which on general principles one would suppose would protect the membrane in this region from their development, rather than excite it. His suggestion that the irritation of the respiratory current might have some influence, is purely speculative.

SYMPTOMATOLOGY.—The development of these growths is attended with no prominent subjective symptoms, other than the interference with normal nasal respiration, which exists according to the size of the growth. Their presence excites but little irritation, and hence excessive discharge does not usually exist, either from the growth itself, or from the membrane surrounding it. Hemorrhage occasionally occurs, probably due to erosion of the mucous membrane, rather than to a rupture of blood-vessels in the tumor. Their growth is neither rapid nor vigorous, hence when they even completely fill the nasal cavity, they are not capable of producing notable external deformity. Their presence, therefore, gives rise simply to the ordinary symptoms which attend the development of the softer non-malignant growths.

PATHOLOGY.—According to the usually accepted view, papillomatous growths of the nasal mucous membrane, consist essentially of an hypertrophy of all the elements which enter into the formation of the normal papillæ of the membrane, this hypertrophy involving these elements uniformly, or the greatest activity of the morbid

<sup>1</sup> "Diseases of the Throat and Nose," Am. Edition, Philadelphia, 1884, vol. ii., p. 377.

<sup>2</sup> St. Bartholomew's Hospital Reports, 1885, vol. xxi., pp. 147-152.

<sup>3</sup> Annal. des Mal. de l'Oreille, No. 5, Nov., 1885.

<sup>4</sup> Bull. et Mem. de la Soc. de Chirurg., Paris, July 28th, 1886, p. 658.

<sup>5</sup> Revista Clinica e Terapeutica, Naples, 1887, vol. ix., p. 75.

<sup>6</sup> Monatsschrift für Ohrenheilk., Feb., 1889.

<sup>7</sup> Revue de Laryngologie, July 1st, 1889, p. 369.

<sup>8</sup> Lancet, 1854, vol. ii., p. 480.

<sup>9</sup> Journal de Méd., Chirurg. et Pharm., Brux., 1859, p. 147.

process may develop in a single element, such as either the connective tissue or the blood-vessels. This process, commencing beneath the surface, encroaches upon and elevates the superficial structures, while at the same time it involves them in a certain morbid activity, by which the epithelial elements are notably increased, the initial point of morbid activity thus being in the deeper layers. Auspitz,<sup>1</sup> on the other hand, reverses this order and argues that the morbid process commences in an activity of the epithelial structures, and extends to the tissues beneath, and thus stimulates or sets up the hypertrophic process in the papillæ, a view which would seem to more closely harmonize with clinical observation, if we accept the teaching that papillomatous growths result from external irritation. Microscopic examination shows each individual papilla to be composed of a framework of more or less richly distributed connective tissue, containing usually a single vascular loop, and the whole covered with epithelial cells. Gland tissue is rarely present, and when present, shows itself in a disorganized or atrophied condition.

At the base of the papillæ, the glandular elements of the membrane show a tendency to proliferation. If we examine a cross-section of the papilla, the microscope will show the central blood-vessels separated by the delicate connective-tissue structures, and surrounded by a ring, as it were, of epithelial cells.

According to Hopmann, papillomata of the nose occur in two varieties, a hard and soft form. This classification would seem to be based on the location of the growth, in that where it occurs near the muco-cutaneous junction, its surface is coated with squamous epithelium, hence it presents a somewhat dense consistency; whereas, when it occurs higher up in the nasal cavity, its epithelial covering is of the columnar variety, and hence the growth presents a soft and yielding contour.

DIAGNOSIS.—The small growths which appear near the margin of the nostril, afford something of the ordinary appearance of a warty growth as seen on the integument, in that they present a grayish pink tinge, and mammillated contour. In this region the growths are usually of Hopmann's hard variety, and do not ordinarily attain any very great size, although in Butlin's case the nostril was almost completely obstructed. This case, moreover, was pedunculated, thus differing from all the other cases occurring in this region, which were sessile in character. When they occur higher up in the nasal cavity, they are of a softer consistency, of a more decidedly pink color, and attain a much larger size, and while the whole growth is usually sessile in character, the individual papillæ may hang down in a somewhat pendulous

<sup>1</sup> Arch. für Derm. und Syph., 1870, vol. ii., p. 25.



manner, so as to give rise to an appearance of pedunculation. Thus while the individual papillæ may obtain considerable size, and present the appearance of an ordinary mucous polyp even, the whole growth presents an exceedingly irregular surface, not unlike perhaps the surface of a raspberry, in which each seed follicle projects, and becomes to a certain extent pendulous.

The gross appearances of the tumor in either region, should be sufficiently characteristic to render a diagnosis easy. Any doubts, however, can easily be cleared up by removing a portion of the growth, and subjecting it to a microscopic examination. They seem to be more frequent in females than in males, and belong to

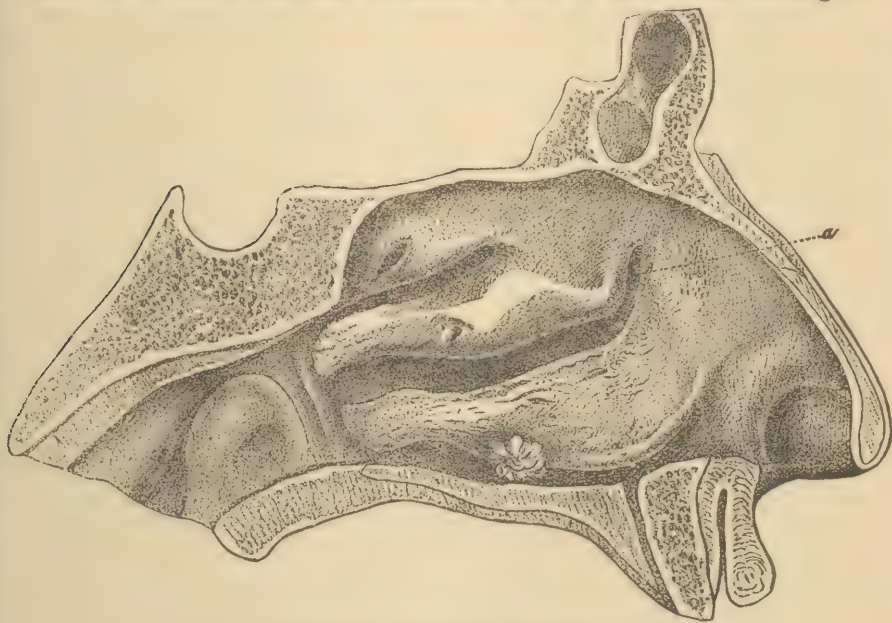


FIG. 113.—Papilloma of the Nasal Mucous Membrane. (Zuckerkindl.)

early adult life, although no age is exempt from them. According to Hopmann, the soft variety is much more common, and arises invariably from the lower turbinated bodies. The hard variety, as before stated, occurs near the muco-cutaneous junction, and may spring from the septum, floor, or the inner face of the ala. The gross appearance of a small soft papilloma is well illustrated in Fig. 113.

PROGNOSIS.—These growths develop somewhat slowly, and involve no serious danger either to health or to life. In Ward's case, death resulted from pneumonia twelve days after the growth was operated upon, while in Verneuil's case, death seems to have resulted from an extension of the tumor. With these exceptions,

the treatment of these cases has always been successful. Verneuil's case, although unique, is of interest in showing how even so benign a tumor may involve very grave danger. The patient was a female aged twenty-nine, in whom the growth had existed for two years, giving rise merely to stenosis, without any other notable symptoms. Access to the tumor was obtained by an incision through the ala of the nose, and the growth removed by a curette and sharp spoon. Recurrence taking place three months later, the superior maxilla was partially resected, and the growth again removed by scraping. The patient reappeared sixteen months later, with a recurrence of the tumor in the nose, together with a pulsating tumor at the inner angle of the orbit, probably an encephalocele, which forbade further operative procedure.

**TREATMENT.**—The soft tumors are to be treated in much the same manner as an ordinary nasal polypus, in that they are to be thoroughly extirpated in such manner as shall do the least injury to healthy structures, while at the same time any possible danger of stimulating the tissues to renewed morbid activity should be avoided. I think there is no question that this can be best accomplished by means of the cold snare, in that it is more easily manipulated, accomplishes its work more thoroughly, and avoids the reaction which not infrequently attends the use of the galvano-cautery. The question of cauterizing the base of the growth, I think, should be governed entirely by a close observation of each individual case, and the recognition of any tendency to recurrence, although Aysaguer seems to attach a certain amount of importance to this procedure. With our present methods of working in the nasal cavity, and the great facility of manipulation and exploration afforded by the use of cocaine, and, furthermore, when we consider that all these growths are attached to, or near the lower turbinated bone, it is not probable that any case of papilloma cannot easily be brought under inspection and within reach of the snare. In the small hard variety, situated near the margin of the nostril, the growth is easily removed by the cold snare. If the snare cannot be used, there is no objection to the use of either the scissors or knife. In this variety, it will probably be found best, in most instances, to cauterize the base of the growth. For this purpose, perhaps chromic acid or acetic acid will give the best results, in that they are the least irritating of the chemical agents used for this purpose. Furthermore, cauterization will often become necessary to control hemorrhage.

In Ward's and Verneuil's cases, access to the cavity was obtained by means of an external operation. This is an exceedingly rare contingency, and was rendered necessary in these cases, largely by the long neglect of the patient in seeking professional advice.

## CHAPTER XXXII.

### ADENOMA OF THE NASAL PASSAGES.

THE nasal mucous membrane does not seem to be a favorable site for the development of this form of neoplasm, in that this tissue is but scantily endowed with glandular structures. As we have already seen, the special function of the glands and follicles in the mucous membrane, is to furnish it with sufficient moisture to keep it soft and pliable. The demand for this is exceedingly limited in the nasal cavity, whose lining is constantly bathed by the serous exosmosis, which constitutes the respiratory function of the nose. Hence, with an exceedingly small number of glands, whose function is by no means active, the tendency to the development of glandular tumors would naturally be but very slight, and in fact, it is a nice question, if from a clinical standpoint, they are ever met with in this region. An investigation of the literature of the subject shows us observations by Gosselin,<sup>1</sup> and Pugliese.<sup>2</sup> Gosselin reports the following case:

A man, aged 43, presented with the following history. Early in the year 1857, he developed nasal stenosis, for which he sought relief at the hospital, early in the April following, when a number of polypi were removed. A second operation of the same character was done in October. In February, 1858, he was seen by Gosselin, who found the right nasal passage completely closed by a tumor, which presented at the nostril, and also projected into the pharynx. It was of firm consistency, and grayish in color, the surface being soft and pultaceous. It was attached in front and above. An operation being decided upon, access to the cavity was obtained by external incisions, and the growth extracted by means of forceps, and digital manipulation. The operation was attended with but slight hemorrhage. Microscopic examination showed the growth to be composed of "abundant epithelial cells, with glandular cul-de-sacs," on which the diagnosis of a glandular tumor was based. The operation was successful, and the patient left the hospital apparently cured.

In reporting his case, Gosselin alludes casually to two others of a similar kind, which had been under his care, and in which there was a recurrence of the growth. Hence the question arose in his mind, as to whether tumors of this class were to be regarded as possessing any malignant tendency. Robin,<sup>3</sup> writing on glandular tumors in general, refers to one of these cases of Gosselin, in which

<sup>1</sup> *Moniteur des Hôpitaux*, No. 34, 1858, p. 275.

<sup>2</sup> *Thèse de Paris*, No. 68, Paris, 1862.

<sup>3</sup> *Gaz. des Hôpitaux*, 1852, No. 12, p. 46.



after recurrence, the tumor successively invaded the bodies of the ethmoid and sphenoid, the patient finally succumbing to an attack of meningitis.

Pugliese, under the title "Adenomata of the Nasal Cavity," reports a case which came under the observation of Verneuil, as follows:

A female, aged 65, presented with the following history: Eighteen months before, she noticed a slight tumor over the left lachrymal sac, which, slowly increasing in size, had resulted, at the time she came under observation, in producing exophthalmos, together with divergent strabismus, and was the seat of considerable pain. The skin over the growth was discolored, and the nasal process of the superior maxilla was eroded. There was no nasal stenosis, epistaxis, or discharge. An external operation was done, and the growth extirpated, it having invaded the external wall of the nasal cavity, and the antrum of Highmore. The microscope revealed the greater portion of the tumor to be composed of large numbers of tubular racemose glands, lined with nucleated epithelium somewhat crowded together, giving rise in some portions to a distention of the glands, verging on cystic degeneration, but the whole tissue showing evidences of nothing but true glandular hypertrophy, although in some parts, the extensive cell-proliferation had resulted so far in disorganizing the gland structure, as to give rise to the suspicion, that the growth might be epithelioma. An operation was successful, and no recurrence was reported.

It cannot be questioned, that this case was one of glandular tumor, although not properly of the nasal cavity, for it undoubtedly commenced in the lachrymal sac.

As regards Gosselin's cases, we have a history of recurrence in two, while there is no further record of his last case after leaving the hospital. There are two views to be taken in regard to this. One is that these were cases of Billroth's cylindroma, or glandular epithelioma, or that they were adeno-sarcoma. The rapid development of the growth, however, would seem to militate against the view that they were cylindroma, as the clinical history of this form of neoplasm usually extends over a long period of years. I think then that we must conclude that they were cases of adeno-sarcoma, a view which entirely harmonizes with the clinical history of the cases, and the pathological descriptions given in the reports, especially when we consider that this diagnosis was made between thirty and forty years ago, at a time when the classification of tumors, based on microscopic examination, was exceedingly imperfect. Certainly, until further clinical evidence of the fact has been established, we must conclude that unmixed adenoma does not occur in the nasal cavity, and that where glandular tissue is met with in a neoplasm, it is purely adventitious, and the clinical significance of the growth is to be determined by the preponderance of other elements, as in adeno-sarcoma, adeno-carcinoma, adeno-fibroma, adeno-myxoma, etc.

## CHAPTER XXXIII.

### CYSTOMA OF THE NASAL PASSAGES.

A CYSTIC tumor, as involving the mucous membrane in the upper air passages, probably arises in all cases from the adenoid tissue of the membrane, either as the result of degenerative changes, or from retention of the normal secretion. Now, as we have already seen, morbid changes in the glandular structures of the pituitary membrane, from a clinical point of view, scarcely ever occur. Hence, we can easily understand how a cystic tumor in this region is among the rarest of occurrences. The only record I find of such a neoplasm having been met with are those reported by Johnson,<sup>1</sup> Watson<sup>2</sup> and Lefferts.<sup>3</sup>

The first of these occurred in a male, aged 24, who had suffered for two years from nasal obstruction, with moderate symptoms of ordinary catarrhal disease, which an examination revealed to be due to the existence of a grayish semi-opaque tumor, the size of a marble, which was pendent from the posterior extremity of the middle turbinated bone, projecting somewhat into the pharynx. It was lacerated and emptied, by means of the forceps, and found to contain a glairy fluid, resembling the white of an egg. The mere crushing seemed to completely dissipate the growth, in that there was no recurrence at the end of ten years.

Watson's case was that of a girl, 15 years of age, who had been troubled with a discharge from the left nostril for several years, together with steadily increasing stenosis of this side. Examination revealed a polypus, which arising in the region of the middle turbinated, had displaced the nasal process of the superior maxilla outward, to a certain extent. The growth was removed with the snare, and was found to be a multilocular cyst, some of the cavities being as large as a split pea. These cavities contained mucus and columnar epithelium. No regular lining membrane could be made out. It is of interest to note, that, after some time, a tumor appeared high up in the opposite nostril. No operation was performed, and the patient was lost sight of.

Lefferts's case occurred in a young woman, and differed in no respect from Johnson's.

This form of neoplasm would, therefore, seem to be simple in character, and easily dealt with, giving rise to no notable subjective

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<sup>1</sup> Brit. Med. Journal, May 23d, 1874, p. 677.

<sup>2</sup> Proceed. Med. Soc., London, vol. iii., p. 134.

<sup>3</sup> Medical News, Phila., December 15th, 1883, vol. xliii., p. 653.

symptoms, other than stenosis with catarrhal discharge. It apparently presents no appearances which render it easy to distinguish it from an ordinary nasal polypus, other than the fact that it occurs singly, although perhaps a careful examination will reveal the fact of its containing fluid contents. In this connection, however, there should be borne in mind the possibility of the occurrence of a meningocele, as in a case reported by Cruveilhier,<sup>1</sup> where the meninges of the brain protruded into the nasal cavity, giving rise to the appearance of a nasal polyp, the true condition being only recognized after death. The presence of pulsation in the growth, together with the existence of cerebral symptoms, should be sufficient to excite suspicion. It would seem from a clinical standpoint that they are to be treated in much the same manner as an ordinary nasal polypus, without requiring the nicer manipulation necessary in dealing with myxoma, to prevent recurrence.

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<sup>1</sup> "Anatom. Pathol. du Corps Humain," Paris, 1835-1842, t. ii., livraison xxvi., pp. 5, 6.



## CHAPTER XXXIV.

### ANGIOMA OF THE NASAL PASSAGES.

CONSIDERING the highly vascular character of the nasal mucous membrane, together with the activity of its functional processes, we would naturally suppose it to be a favorable site for the development of angiomatous tumors, yet as a matter of clinical fact, they occur very rarely in this region, if the paucity of the literature on the subject is to be accepted as evidence. The records embrace only observations by Verneuil,<sup>1</sup> Wagner (two cases),<sup>2</sup> Steinbrügge,<sup>3</sup> Seiler,<sup>4</sup> Richet,<sup>5</sup> Roe,<sup>6</sup> who has given us an excellent resumé of the subject, Jarvis,<sup>7</sup> Vanderpoel,<sup>8</sup> and Burckhardt.<sup>9</sup> In addition to these, we find embraced in Roe's tables, reports of cases by Nélaton,<sup>10</sup> Huguier,<sup>11</sup> Panas,<sup>12</sup> Guyon,<sup>13</sup> Dumenil,<sup>14</sup> a second case by Richet,<sup>15</sup> and a case by Delavan.<sup>16</sup>

An examination of the original papers, however, fails to justify Roe in reporting them as angiomata, as in no single instance did these writers even suggest this diagnosis. The growths apparently were cases of highly vascular myxomata or fibromata, with the exception of Panas's and Richet's cases, in which the *post-mortem* examination demonstrated a connection between the nasal growth and the cavernous sinus, indicating the tumor to be probably a varix, rather than an angioma. We thus find our clinical knowl-

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<sup>1</sup> Annal. des mal. de l'oreille, vol. i., p. 169.

<sup>2</sup> "Diseases of the Nose," N. Y., 1884, pp. 149, 150.

<sup>3</sup> Zeit. für Ohrenheilkunde, vol. viii., p. 110.

<sup>4</sup> American Specialist, Phila., 1881, vol. ii., p. 7.

<sup>5</sup> Cited by Débrie, Thèse de Paris, No. 5, 1882.

<sup>6</sup> Trans. of the Amer. Laryngological Assn., 1885, p. 94.

<sup>7</sup> International Journal of Antiseptics, vol. i., p. 1.

<sup>8</sup> Cited by Jarvis, loc. cit.

<sup>9</sup> Bericht über die Chirurgische Abtheilung des Ludwigs-Spitals, Charlottenhilfe (1884), 1885, 11.

<sup>10</sup> Cited by Beuf, Thèse de Paris, No. 69, 1857, pp. 21, 25.

<sup>11</sup> Bull. de la Soc. de Chir. de Paris, 2 S. i., p. 7; seance of January 4th, 1860.

<sup>12</sup> Bull. de la Soc. Anat. de Paris, 1872, vol. xlvii., p. 435.

<sup>13</sup> Bull. de la Soc. de Chir. de Paris, 3 S. vol. ii., p. 356; seance of June 25th, 1873.

<sup>14</sup> Ibid., p. 339, seance June 18th, 1873.

<sup>15</sup> Cited by Débrie, op. cit.

<sup>16</sup> Arch. of Laryngology, vol. iii., p. 174.

edge of this form of neoplasm, must be based on the records of but ten cases, indicating an exceeding rarity of occurrence.

ETIOLOGY.—The essential pathological lesion, which seems to govern the development of this form of neoplasm, does not seem to be primarily in a disturbance of the circulation, or in any condition which leads to a distention of the normal blood-vessels, but it is rather to be looked upon as due to some disturbance in the process of nutrition in the vascular walls themselves. Hence, the suggestion of Steinbrügge, that interference with the return circulation may be a cause, is scarcely to be accepted, nor that of John Mackenzie,<sup>1</sup> who suggests that a plethoric condition of the turbinated tissues may act as a predisposing cause, especially when we consider the great frequency of turgescence of these tissues, and the exceeding rarity of angiomatous tumors. We are unable, therefore, to assign any definite cause, either active or predisposing, for the development of these neoplasms. Of the cases reported, eight were males, and but two were females. Most of the cases occurred during the earlier period of life, although no age seems to be exempt, Roe's case occurring in a man aged sixty-eight.

SYMPTOMATOLOGY.—The symptoms which arise from the presence of these growths in the nose, are largely mechanical, nasal respiration being interrupted, according to the size of the tumor, while its presence also excites a certain amount of muco-purulent discharge. As would be naturally inferred, their presence is attended with frequent attacks of epistaxis, although this rarely seems to be of a violent character, and yet its frequent recurrence may lead to a notable impairment of the general health. External deformity, dependent on any dislocation of the hard parts, is never present, although where the growth projects near the nostril, a spreading of the soft parts may occur. In short, an angiomatous tumor of the nasal cavity gives rise to the same train of symptoms which would be met with in connection with any benign growth, of soft and yielding consistency.

PATHOLOGY.—This form of tumor is composed almost entirely of blood-vessels, held together by a slight network of connective tissue. Their mode of development is not known. Their starting point may be in a primary dilatation of the normal vascular structures, or what is more probable, we may have an excessive activity of the normal nutritive processes, by which the normal blood-vessels are formed. This process results in the formation of a tumor, in which nutritive activity expends itself, as it were, in developing the walls of the blood-vessels, leaving no energy for the development of the other elements of the tissue. The vascular

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<sup>1</sup> Trans. Amer. Laryngological Assn., 1885, p. 98.

walls produced in this way, are necessarily feeble, and possess slight powers of resistance. The course of each blood-vessel is marked by dilatation, and the formation of even large spaces, as it were, scattered throughout the growth. An examination of the tissue under the microscope (see Fig. 114), will show a network of wavy connective tissue, in some places densely packed together, and in other places of exceedingly delicate structure; these bands surrounding spaces, as it were, of varying sizes, each space indicating a blood course, and yet ordinarily the blood-vessels in their continuity cannot be traced. Many of these blood spaces are lined with epithelium, while in others this element is entirely absent. The outer surface of the tumor shows evidences of the development of a

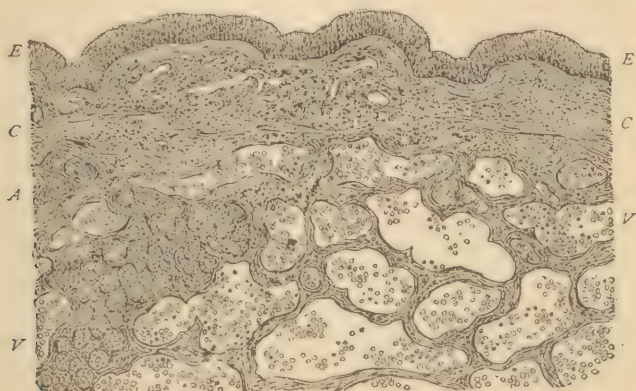


FIG. 114.—Cavernous Angioma with Glandular Hyperplasia of Nasal Mucosa. *E*, columnar ciliated epithelium; *C*, *C*, hyperplastic fibrous connective tissue, with capillary blood-vessels; *A*, hyperplastic acinous mucous glands; *V*, *V*, cavernous veins, partially filled with blood.

capsule, which seems to be of later growth, while above this, we find the superficial layer of the mucous membrane, the gland structures seeming to have undergone partial or complete degeneration. No portion of the nasal cavity seems to be exempt from these growths, in that they may spring from either the lower or middle turbinated bodies, or from the septum, but they usually occur rather nearer the anterior nares.

DIAGNOSIS.—These growths usually present appearances sufficiently characteristic to make their recognition comparatively easy. Their surface is somewhat irregularly rounded, and presents a reddish or purplish hue, which indicates unmistakably their highly vascular character, a lighter red color, indicating usually, a larger element of arterial blood in the growth. The fluid character of the contents of the growth is further evidenced by manipulation with the probe, which shows them easily indented. This matter



of examination, however, should be accomplished with great care, in that they are easily punctured by the probe, whereby hemorrhage of an exceedingly troublesome character may supervene. If they are within reach of the finger, or even by ocular inspection, pulsation of a more or less decided character may be recognized. There is probably no growth which might lead to an error in diagnosis, unless possibly as in Panas's and Richet's cases, that of a varix, springing from the base of the brain. This condition, however, would be indicated by the existence of symptoms referable to the brain.

COURSE AND PROGNOSIS.—These growths develop slowly, and run a somewhat protracted course, of usually from two to five years. They involve usually no danger to life, and are ordinarily amenable to surgical treatment, their removal not being attended with any great danger, while there is no tendency to recurrence. In Verneuil's case, death occurred four years after the removal of the growth, from extreme cachexia, but probably not as the result of the tumor, while in Richet's case, death occurred twelve days after an attempt at removal of the tumor by means of forceps, which was attended with profuse hemorrhage, an accident which was, perhaps, due in part to the use of the forceps.

TREATMENT.—These growths can easily be removed through the natural passages, a procedure which ordinarily is attended with no great difficulty. The only danger to be anticipated lies in the excessive hemorrhage which may attend the operation. Hence, the prominent indication is to remove them by such means as will best avoid this accident. It is scarcely necessary to say, that the forceps never should be used. Perhaps no device will accomplish their removal more safely than the snare, either the cold wire or the galvano-cautery, and of these two devices, on every ground, Jarvis's cold wire *écraseur* should be preferred, in that it can be manipulated with greater ease, and after the loop has been placed in position, the attachments can be severed by so slow a movement as that much of the hemorrhage can be avoided. This is a point on which Jarvis laid special emphasis in reporting his case, he having occupied three hours in tightening his loop, thus accomplishing the manipulation with the loss of but a few drops of blood. Furthermore, if possible, it is a matter of some importance that the loop should be adjusted well down upon the pedicle of the tumor, in that, of course, there is greater danger of hemorrhage in cutting through the body of the growth, although this may occasionally become necessary, on account of the size of the tumor.

## CHAPTER XXXV.

### CHONDROMA OF THE NASAL PASSAGES.

THIS is a term which seems to have been used somewhat carelessly in late years, since the nasal cavity, and especially the morbid conditions of the nasal septum, have become the subject of so much active investigation, and undoubtedly many cases which are called enchondroma, or ecchondroma, are nothing other than simple deformities or deflections of the nasal septum. Thus, in treating this subject, Mackenzie<sup>1</sup> refers to a case of this character reported by Erichsen,<sup>2</sup> which, without question, was one of deflected septum. The same can be said of Bryant's,<sup>3</sup> Ure's,<sup>4</sup> Richet's,<sup>5</sup> and Durham's<sup>6</sup> cases.

The use of this term should be restricted to that large, round, nodulated tumor, so very rarely met with in the nose, which presents all the clinical characteristics of a fibroma, and yet which, on examination, is found to contain hyaline cartilage. Undoubted instances of this form of growth have been reported by Verneuil,<sup>7</sup> Devalz,<sup>8</sup> Ashhurst,<sup>9</sup> and Mackenzie.<sup>10</sup>

We find, therefore, that the nasal cavities do not present favorable conditions for the development of cartilaginous tumors. Thus, Weber, out of three hundred and seven cases of solid tumors of the upper jaw, found enchondroma but eight times, and in two hundred and sixty-seven cases of cartilaginous tumors in all portions of the body, the upper jaw was involved in but eight cases.

We can assign no cause for the development of these growths, although they seem to belong to the period of adolescence, viz., from eleven to seventeen years of age. When present, they give rise to much the same train of symptoms as are met with in fibroma, viz., nasal stenosis, muco-purulent discharge which may be offen-

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<sup>1</sup> "Diseases of the Throat and Nose," Am. ed., Phila., 1884, vol. ii., p. 379.

<sup>2</sup> Lancet, 1864, vol. ii., p. 153.

<sup>3</sup> Lancet, 1867, vol. ii., p. 225.

<sup>4</sup> Lancet, 1861, vol. i., p. 411.

<sup>5</sup> Cited by Casabianca, Thèse de Paris, 1877.

<sup>6</sup> Holmes's "System of Surgery," London, 1876, vol. iv., p. 319.

<sup>7</sup> Cited by Spillman: "Dict. Encyc. des Sciences Médicales," second series, vol. xiii., p. 184.

<sup>8</sup> Gaz. Méd. de Bordeaux, 1873, p. 105.

<sup>9</sup> Tr. Path. Soc., Phil., vi., 146.

<sup>10</sup> Op. cit., p. 380.

sive as the result of retention, together with marked external deformity, although neither epistaxis nor pain occurs. Their development is even slower than that of fibroma. In Mackenzie's case, there was no external deformity, although in Verneuil's case, after a long lapse of time, the facial deformity was very marked. In structure, they are composed of hyaline cartilage, usually combined with white fibrous, and some yellow elastic tissue, generally distributed on its surface. In Verneuil's case the tumor was sessile in character, while in Mackenzie's it was somewhat pedunculated.

They are easily recognized by their exceeding great density, and also by their immobility. They are of a yellowish pink color, irregularly nodulated surface, and present a hard cartilaginous sensation to the touch. They can be readily distinguished from an osteoma by means of the needle, although they may easily be confused with a fibroma, recognition only being made by an examination of a portion of the growth, after removal. In discussing these tumors in general Devalz states, that in most instances they occur in young subjects, and are usually not larger than a grain of corn, but may attain sufficient size to seriously impede respiration. They are ordinarily situated at the junction of the cartilaginous septum with one of the alar cartilages, that is, at the anterior, inferior angle of the cartilaginous septum. He mentions this situation, and the form of the tumor, as points in differential diagnosis between this affection and deviations of the septum.

The prognosis is usually good, in that the growth appears to be quite amenable to surgical interference. In Verneuil's case an external operation was done, with entire success, while in Mackenzie's case the tumor was extirpated by means of the cold snare, manipulated through the natural passages. They seem to show no disposition to recurrence. The method of removal is to be determined by the size and character of the growth. Of course, where feasible, this should be done by means of the cold snare, although the curette, or even gouge, can be used with impunity, as the operation is never complicated by hemorrhage from the growth itself.



## CHAPTER XXXVI.

### SARCOMA OF THE NASAL PASSAGES.

WHILE the early writers on medicine included all varieties of neoplasms of the nose under the general head of polypi, they found little difficulty in making a distinction between their malignancy and non-malignancy. Thus Hippocrates described five varieties of polypi, one of which he regarded as a kind of cancer, a classification of nasal growths which was adopted up to the time of Ambrose Paré. Under this general term of cancer, however, were embraced all forms of malignant tumors, including the various forms of carcinomata, as well as what are now termed sarcomata. The distinction which has been made, in our day, between carcinoma and sarcoma, becomes a matter of no little importance, for whereas they both are to be regarded as malignant growths, they differ in a marked degree, not only in their course and clinical history, but also in their prognosis. Sarcoma is by no means frequently met with in the nasal passages, and its literature is somewhat limited. I have thought it wise, therefore, to give a brief resumé of all the cases reported, with the view, that, in this manner, we shall obtain a better and fuller comprehension of its clinical significance, history, and tendencies. In many of the cases, when the diagnosis has been obscure, I have been compelled to assume the responsibility of assigning the case to either the sarcomatous or carcinomatous group, according to my own estimate of its clinical history.

CASE I.—Reported by Pelleta.<sup>1</sup> This was the case of a young man who died in coma, having previously suffered from severe pains in the head, the source of which does not seem to have been suspected. Post-mortem examination, however, revealed the existence of a large tumor, which springing from the septum had completely filled the right side of the nose, destroying the cribriform plate of the ethmoid and invading the cranial cavity, where a tumor the size of an egg was found, that had pressed upon and partly destroyed the right lobe of the cerebrum. The case was originally reported as one of polypus, but Casabianca regarded it as an undoubted case of sarcoma.

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<sup>1</sup> Exercit. Patholog., Milan, 1820, p. 7. (As cited by Casabianca.) Thèse de Paris, 1877.

CASE II.—Van Buren<sup>1</sup> has reported a case, as cancer of the nose, which so strikingly illustrates the characteristic clinical features of sarcoma, as to show with little question that the growth was really a sarcoma. The microscope, moreover, revealed the tumor to be composed of spindle cells. The patient was a woman, aged 34, who eight years previously had a violent attack of epistaxis, followed by a similar accident a year later, together with notable stenosis. Shortly after this, a number of polypi were removed, the operation being attended with hemorrhage of a dangerous character. For four years following, the progress of the tumor seems to have been controlled by the application of caustics, after which it took on a renewed activity, resulting in great deformity of the nose, with absorption of the nasal bones. Ligation of the right common carotid was finally resorted to, with the hope of arresting the growth, apparently with success, for the size of the tumor seemed to diminish notably, although the patient died eighty-two hours after the operation. An autopsy showed the growth to have sprung from beneath the lower turbinated bone, and to have filled the nasal cavity, successively invading the antrum and ethmoid cells.

CASE III.—Reported by Michaux;<sup>2</sup> this was the case of a male, forty years of age, in whom a nasal tumor, which had existed for about nine months, giving rise to stenosis of the right nostril, frequent attacks of epistaxis, facial neuralgia, and displacement of the eyeball with consequent diplopia, was removed successfully, after extirpation of the superior maxilla. The patient is said to have been cured, although apparently not seen later than forty days after the operation.

The case is reported as one of cancer, but its clinical history seems to indicate that it was more probably one of sarcoma.

Chassaignac<sup>3</sup> reports the following case, which both from its clinical history and the microscopical appearances of the growth, is evidently one of sarcoma.

CASE IV.—A male, aged 40, in February, 1851, had a violent epistaxis, followed by a similar attack eight months later. Four months afterward, he discovered a tumor in the nasal cavity, which was operated upon in March, 1852. A recurrence occurred in the following July, as evidenced by nasal stenosis, with headache, and repeated attacks of epistaxis. In May, 1853, there was complete stenosis. A second operation was done in September of that year, with relief to all the symptoms, although six weeks later, the return of the tumor was evidenced by the return of his headaches. The growth developed rapidly now, resulting soon in complete stenosis, with notable deformity of the external nose. In January, 1854, he was seen by Chassaignac, at which time both nasal cavities were completely filled with a soft fungoid growth, which could be seen anteriorly, and felt by the finger in the posterior nares. This case is of interest also, in the fact that Chassaignac here devised and first put in practice his operation for gaining free access to the nasal passages, by tilting the external nose to one side. The entire growth was extirpated, and found to involve the nasal cavities, together with the frontal and maxillary sinuses. The tissue was found to be fibro-plastic in character. The patient left the hospital a month later; the further history not being reported.

<sup>1</sup> New York Journal of Medicine, 1849, vol. ii., p. 297.

<sup>2</sup> Gaz. Méd. de Paris, 1849, No. 48, p. 931.

<sup>3</sup> Moniteur des Hôpitaux, Paris, 1854, vol. ii., p. 266.

CASE V.—Gosselin<sup>1</sup> reports the case of a female, aged 38, who presented with a history of nasal tumor, dating back seven years, which had given rise to violent attacks of epistaxis. When seen, the tumor completely filled the nasal cavity, and extended to the pharynx behind, and gave rise to facial deformity and exophthalmos. Access to the cavity was obtained by splitting the nose in the median line, after which the growth was extirpated, and found to have had its origin in the floor of the nares. No recurrence had taken place at the end of seven months. The diagnosis of sarcoma was based on the gross appearances of the tumor.

CASE VI.—Erichsen<sup>2</sup> reports as sarcoma, a case of intra-nasal tumor, occurring in a male, 42 years of age, in whom the growth, arising from the nasal process of the superior maxillary bone, had in three months completely filled the left nostril. The growth had given rise to nasal stenosis and epistaxis. There was no glandular enlargement. The tumor was extirpated by an external operation. The subsequent history is not given.

CASE VII.—In 1868 we find recorded the history of a case by Fayrer,<sup>3</sup> in which a large growth was removed from the nasal cavity by Dieffenbach's operation, in a woman aged thirty. Its origin was from the septum. The growth had existed for three years, and gave rise to considerable deformity of the external nose. The microscope showed the tumor to be composed of germinal cells. This was probably the first instance in which this form of nasal growth was recognized, in contradistinction from carcinoma. The result of the operation was not published.

CASE VIII.—Rabitsch<sup>4</sup> reports a case of Dittel's, in which the patient, a female about 15, had suffered for five months from a tumor in the throat, pressing the palate forward, and interfering with respiration.

Five years before this, she had had a severe attack of epistaxis, and during the five succeeding years, she had been operated upon ten or twelve times for nasal polypi.

On examination, the tumor was found to be pedunculated, and attached to the right upper turbinated body. It was removed through the nose, by means of the galvano-cautery snare. A microscopic examination showed it to be a branching-celled sarcoma, with considerable glandular tissue. No subsequent history of the case is given.

CASE IX.—A few years later we find Viennois<sup>5</sup> reporting two cases. His first case was a woman, aged 43, in whom a myxo-sarcoma of the size of an egg was removed by Ollier's operation, of depressing the nose. In this case, there was an extremely fetid discharge from the nose, with very severe suborbital pain, and exophthalmos. There was no recurrence at the end of seven years. His second case was that of a melano-sarcoma, in a woman aged 63, on whom the same operation was done, for a growth which had given rise to distortion of the external nose, with exophthalmos and intense supraorbital pain. This patient succumbed eight days later, to pyæmia.

CASE X.—A case is reported by Mason,<sup>6</sup> of a myeloid sarcoma, which occurred in a woman aged 60, in whom the prominent symptom was hemorrhage. The growth was removed by means of forceps, and was found attached to the

<sup>1</sup> *Gaz. des Hôpitaux*, 1856, xxix., p. 175.

<sup>2</sup> *Lancet*, 1864, vol. ii., p. 153.

<sup>3</sup> *Med. Times and Gaz.*, July 4th, 1868, p. 3.

<sup>4</sup> *Allg. Wien. Med. Zeit.*, 1869, p. 382.

<sup>5</sup> *Lyon Médicale*, 1872, No. 18, p. 8.

<sup>6</sup> *Med. Times and Gaz.*, 1875, vol. i., p. 552.



septum on one side. A recurrence took place at the end of two weeks. A second operation was now done, consisting of slitting up the nostril, and removing a portion of the nasal process of the superior maxilla, after which the growth was dissected out, and the base cauterized with chloride of zinc. Still another recurrence, two months later, necessitated the removal of a portion of the upper lip. At the end of four months there was no recurrence.

CASE XI.—In the same year we find Osio<sup>1</sup> reporting a case of melanotic sarcoma, occurring in a man aged 55, in which the tumor had apparently existed for eight months. It had its origin in the outer wall of the right nasal passage, and subsequently invaded successively the opposite side, the antrum of Highmore, the orbit, and the sphenoidal sinuses, giving rise to deformity of the external nose, nasal stenosis, pain, exophthalmos, and injection of the conjunctiva. A radical operation was attempted, followed, at the end of seven days, by the death of the patient from meningo-encephalitis.

CASE XII.—In the same year Kolaczek<sup>2</sup> operated on a case of round-celled sarcoma, in a man aged 54, which had existed for a year, and given rise to a considerable distortion of the external nose. His operation consisted in slitting up the nose in the median line, and removing the growth by the curette.

CASE XIII.—Weinlechner<sup>3</sup> reports a case of a boy, aged 14, in which a sarcoma, starting in the nose, invaded successively the pharynx, orbit, and opposite side, giving rise to stenosis and exophthalmos. Death occurred as the result of the growth, no operation being attempted.

CASE XIV.—Grynfeldt<sup>4</sup> has reported a case, in which a sarcomatous tumor was observed in a female, aged 26, which had apparently existed for six months, giving rise to repeated attacks of epistaxis. When first observed, it presented a small mass about the size of a pea, attached to the septum, just within the nostril. It was removed with the forceps and scissors, and the base cauterized with chloride of zinc paste. A recurrence at the end of twenty days, demanded a second cauterization, and a similar recurrence a month later, was followed by a third repetition of this procedure. The disease recurring a third time, Grynfeldt removed a section of the septum, operating through the natural passages, and cauterized the edges, which seems to have completely eradicated the disease. The tumor was a mixed round and spindle cell sarcoma.

CASE XV.—Weinlechner<sup>5</sup> reports a case of a male, aged 39, in which he removed a growth from one nasal cavity, which had existed for a year and a half, and produced a moderate amount of distention of the external nose, without noticeable deformity. The growth was removed by the curette and spoon, manipulated through the natural passages, and was found to be a round-celled sarcoma. There was no recurrence at the end of a month.

CASE XVI.—Weber<sup>6</sup> cites a case of a child, who died as the result of a sarcoma, which had been allowed to develop without operative interference. The autopsy revealed that the growth, springing from the region about the right middle turbinated bone, had extended along the lachrymal canal to the right orbit, while an independent centre of development was established on the opposite side, giving rise to a tumor over the left infra-orbital foramen.

<sup>1</sup> Rev. de Cien. Med., Barcel., 1875, vol. i., p. 312; 1876, vol. ii., p. 22.

<sup>2</sup> Arch. f. Klin. Chir., Berlin, 1875, xviii., 344-346.

<sup>3</sup> "Bericht der k. k. Krankenanstalt Rudolph-Stiftung in Wien" (1875), 1876, p. 350.

<sup>4</sup> Montpellier Médicale, 1876, vol. xxxvii., pp. 307 and 511.

<sup>5</sup> "Bericht der k. k. Krankenanstalt Rudolph-Stiftung in Wien" (1876), 1877, p. 314.

<sup>6</sup> "Handb. der Allg. und Spec. Chir.," Pitha and Billroth, vol. iii., p. 201.

CASE XVII.—Duplay<sup>1</sup> cites a case of fibro-sarcoma, in a woman aged 52 years, in which the growth had apparently existed for twelve years, producing considerable distention and distortion of the nose. The cavity was opened by slitting up the nostril, and the tumor entirely eradicated. According to the report, there was no recurrence.

CASE XVIII.—In a case reported by Gallozzi,<sup>2</sup> a sarcomatous tumor, which had existed for seven months, gave rise to an external deformity, with absorption of the nasal bones, and the nasal process of the superior maxilla. The cavity was opened, by dividing the nose in the median line, a modification of Péan's operation, and the growth extirpated, its attachment being to the external wall. The subsequent history was not reported.

CASE XIX.—In a case reported by Sargent<sup>3</sup> as having occurred in Péan's clinic, the history would seem to indicate, that the starting point of the disease was in nasal polypi, the symptoms of which had existed for ten years, and for which the patient had been subjected to operative procedure, respectively three years, and nine months, previous to his appearance in the clinic, at which time a grumous-looking mass was found filling the left nasal passage, presenting anteriorly, while posteriorly it filled both choanæ. The patient was a male, aged forty-three. Free access was gained to the nasal cavity by Péan's usual operation, and the growth extirpated. It was found that the tumor had invaded the antrum, which necessitated the removal of the anterior wall of the superior maxilla. The whole mass was eradicated, and the cribriform plate of the ethmoid bone scraped. The patient was discharged a month later, the subsequent history not being recorded. The growth was found to be a myxosarcoma.

CASE XX.—A somewhat unique clinical history is given in a case reported by Verneuil, as follows: A young man, aged 19, presented a history of repeated attacks of epistaxis, together with nasal stenosis, dating back six months. When first observed, the tumor was discovered filling the right nasal fossa. The removal of a piece, showed the growth to be sarcomatous in character. The internal administration of iodide of potash, together with local astringents, seemed to diminish the size of the tumor, in that the nose became permeable, while the epistaxis was less frequent. About this time, a slight exophthalmos developed, followed soon by the formation of an abscess at the inner canthus of the right eye, together with headache, and some obscure brain symptoms, which afterward becoming more marked, the patient succumbed. The autopsy revealed the fact that the orbital abscess communicated with a large abscess at the base of the brain, which was the result of extension of the sarcomatous disease through the cribriform plate.

CASE XXI.—Richet<sup>4</sup> operated on a young man, aged 19, for a growth in the right nasal fossa, which had existed for four years, and gave rise to no marked symptoms, other than distention and deformity of the external nose. The tumor had been previously operated on by forceps, but had recurred. Access to the cavity was obtained by means of Chassaignac's operation, after which the growth was extirpated by means of a blunt hook. The subsequent history of the case was not published.

CASE XXII.—Mo<sup>5</sup> has reported a case of fibro-sarcoma, occurring in a

<sup>1</sup> "Traité Élem. de Pathologie Externe," Paris, 1877, t. iii., p. 846.

<sup>2</sup> Il Morgagni, 1878, vol. xx., p. 565.

<sup>3</sup> Thèse de Paris, 1881, No. 316, p. 41.

<sup>4</sup> Ann. des Mal. de l'Oreille et du Larynx, Paris, 1881, vii., 327-331.

<sup>5</sup> L'Osservatore, Gazzetta delle Cliniche di Torino, 1882, vol. xviii., pp. 641-673 and 705.

woman, aged 22, which had existed for one year, giving rise to nasal stenosis, sanious discharge, etc., and of late, notable deformity of the external nose, with facial neuralgia and exophthalmos. Access to the cavity was secured by means of Bruns's operation, and the whole growth removed, no recurrence having occurred at the end of two months.

CASE XXIII.—An exceedingly interesting case was reported by Hopmann,<sup>1</sup> of a tumor which had existed for two years in a man, aged 44, occupying mainly the right side, although extending posteriorly into the left. The prominent symptoms were stenosis, with recurrent attacks of hemorrhage. Free access to the cavity was obtained by performing Bruns and Demarquay's operation, after which the growth was thoroughly extirpated, by means of the curette. Its recurrence at the end of a month demanded a second operation, a third operation three months later, a fourth two months later, and a fifth five months later, finally resulting in the radical extirpation of the growth, no recurrence being reported. It should be stated, however, that Hopmann does not report this as a case of sarcoma, simply stating that the histological character of the growth coincided closely with the "Zottenkrebs" of Billroth, namely, an epithelial growth, with sarcomatous elements scattered through it, although Mackenzie<sup>2</sup> and Moure<sup>3</sup> included this case in their list of sarcomatous tumors.

CASE XXIV.—Trelat<sup>4</sup> reports a case of sarcoma, in a man, aged 63, which had existed for two years, giving rise to epistaxis and deformity, in which pieces of the tumor were expelled spontaneously, which, on examination, were shown to be composed mainly of embryonic and glandular tissue. No operation was performed in this case.

CASE XXV.—Burckhardt<sup>5</sup> reports a case of melano-sarcoma of the nasal cavity, occurring in a woman aged 43. The patient had suffered from nasal stenosis, severe pain, and frequent hemorrhages. The growth involved both nasal cavities. Access to the growth was obtained by splitting the nose, and the growth was removed by means of the sharp spoon, and the finger. The subjective symptoms were improved for a short time, but there was recurrence five months after the operation.

CASE XXVI.—Terrier<sup>6</sup> reports a case of a man, aged 45, in whom nasal stenosis existed for two years, due to a growth in the left nasal fossa, which was found to be a spindle-cell sarcoma, by the removal of a small piece, for microscopic examination. The prominent symptoms were external deformity, with fetid discharge, and severe neuralgic pain, and epiphora. The cavity was opened by splitting the nose in the median line, and the growth removed. There was no return at the end of two months.

CASE XXVII.—Butlin<sup>7</sup> reports a case of sarcoma in a woman, aged 78, which produced notable deformity of the external nose, with stenosis and epistaxis. Portions of the growth were removed by the galvano-cautery loop, but it was never thoroughly extirpated.

CASE XXVIII.—A case reported by Lincoln<sup>8</sup> is interesting, in that two

<sup>1</sup> Arch. für Path. Anat., Berlin, 1883, Bd. xciii., p. 235.

<sup>2</sup> Op. cit.

<sup>3</sup> Revue Mensuelle de Laryngol., 1886, pp. 417-425.

<sup>4</sup> Gaz. des Hôpitaux, 1883, lvi., p. 210.

<sup>5</sup> "Bericht über die Chir. Abtheilung des Ludwigs-Spitals Charlottenhilfe im Jahre 1884," p. 12.

<sup>6</sup> Ann. des Mal. de l'Oreille et du Larynx, Paris, 1884, x., 279-282.

<sup>7</sup> "St. Bartholomew's Hospital Reports," 1885, No. 21, pp. 147-152.

<sup>8</sup> Trans. Amer. Laryngological Assn. for 1885, N. Y., 1886, pp. 92-94.



operations had been previously done, followed by recurrence, at intervals of two and eight months, for a melano-sarcoma, which had existed for three years, giving rise to epistaxis and fetid discharge, with external deformity. An operation was done by means of the galvano-cautery loop, the patient being under an anæsthetic, and the whole growth extirpated. Its attachments were found to be from the middle and lower turbinated bones and the floor of the nares. This patient was kept under observation for several months, for local cauterization and other treatment, with the result of the complete eradication of the disease.

CASE XXIX.—Schmiegelow<sup>1</sup> had an opportunity of seeing a case of sarcoma in a girl, aged 14, within two or three weeks after its development, which, at that time, presented a small, rounded, pulsating mass, attached to the septum, which he removed with his finger. The growth, however, recurred rapidly, causing almost complete stenosis in a few weeks, after which it was removed by means of the galvano-cautery. It was a round-cell sarcoma, and at the end of seven months it had not recurred.

CASE XXX.—In the same paper Schmiegelow<sup>2</sup> reports a case, communicated to him by Max Schäffler, in which a man, aged 42, with mucous polypi in the nose, suffered also from a fibro-sarcoma of the naso-pharynx, which was removed by the galvano-cautery snare. An interesting feature of the case was that the mucous polypi took on sarcomatous degeneration, and showed a hemorrhagic tendency so great that the patient eventually died from epistaxis. There were also sarcomatous deposits in the viscera.

CASE XXXI.—Higgins<sup>3</sup> reports a case of a male, aged 66, who fourteen years before had a severe attack of epistaxis; seven years later he had another attack which confined him to the house for four weeks. After this time, he had recurrent hemorrhages at intervals of four to six weeks. About six weeks before he came under observation, a tumor appeared at the inner canthus of the left eye. On examination, the left nostril was found to be completely blocked by a neoplasm, while the tumor at the canthus of the eye was at this time about one inch in diameter, and was pulsating, although there was no bruit. The patient continued to suffer from hemorrhages until his death from pneumonia, which occurred one month after admission to the hospital. No operation was attempted. An autopsy revealed that the tumor was sarcomatous in nature, and had commenced in the nose, and spread along the lachrymal canal, and invaded the frontal sinuses, the roof of the orbit having been entirely absorbed.

CASE XXXII.—The rapidity which a sarcomatous growth may take on, even in its early stages, is well illustrated in a case reported by Fowler,<sup>4</sup> in which a growth of this character was observed in a boy, aged 16, which apparently had existed but for two weeks, and which in that time had developed notable deformity of the external nose, while the tumor protruded from the nares. A piece was removed, which showed the tissue to be an alveolar sarcoma. Its removal by means of the snare was followed by a recurrence at the end of two weeks, when Fourneaux-Jordan's operation was done, with the result, apparently, of the complete eradication of the growth, although the subsequent history of the case has not been reported.

<sup>1</sup> "Tumeurs malignes primitives du nez," *Revue Mensuelle de Laryngologie*, Paris, 1885, pp. 421 and 482.

<sup>2</sup> *Loc. cit.*

<sup>3</sup> "Guy's Hospital Reports," 1884-5, London, 1886, third series, vol. xxxiii., pp. 91-

102.

<sup>4</sup> *Lancet*, 1885, vol. ii., p. 992.

CASE XXXIII.—Moure<sup>1</sup> was fortunate enough to observe a case, from very early in its history, and to follow the entire progress of the disease to its termination. A woman, 43 years of age, had suffered for about a year with successive attacks of epistaxis, and discharge of dry scales or crusts from the nose. She complained of no pain, and there was no external deformity. Anterior rhinoscopy revealed a tumor about the size of a cherry stone, attached to the right middle turbinate anteriorly, touching the septum but not adhering to it. The patient declined operation, and visited the sea-shore for her general health. The local symptoms, however, became worse, and when she presented herself a year and a half later, nasal respiration had become decidedly obstructed, and there was a muco-purulent discharge from the affected nostril. Examination now showed the tumor completely occluding the nostril. Access to the cavity was obtained by Dieffenbach's operation, and the neoplasm removed by means of the forceps and curette, and the base thoroughly scraped with the curette. There was no history of recurrence, at the end of seven months.

CASE XXXIV.—Calmettes and Chatellier<sup>2</sup> report a case of a young woman, aged 30, who had suffered from epistaxis, with slight nasal stenosis, in infancy. These symptoms did not again present themselves until her twenty-third year, when they recurred, and the patient noticed a little excrescence in the left nostril. On examination, a tumor, the size of a cherry stone, was observed in the left middle meatus, attached to the cartilaginous septum. The growth was removed by the galvano-cautery snare, and measured 1½ centimetres in diameter. A portion of the surface was somewhat ulcerated. Microscopically, the mass of the tumor was made up of fusiform cells, and some fine fibrillæ, thus identifying the growth as a spindle-celled fibro-sarcoma. The ulcerated surface was made up of a large number of round cells, with very little inter-cellular substance. The surface of the tumor was covered with flat epithelium. There was no recurrence at the end of eleven months.

CASE XXXV.—Weir<sup>3</sup> cites a case of a fibro-sarcoma of the nose, occurring in a male, 42 years of age, who had been troubled for a year with nasal stenosis on the right side, and recurrent epistaxis. A tumor had existed in the right nostril, to his knowledge, for two months. On admission, the naso-pharynx was found free, the right side of the nose being occupied by the tumor. Access to the growth was obtained by Chassaignac's operation, and a portion of it removed by means of the curette. It, however, was found to involve the sphenoidal and ethmoidal sinuses, and it was deemed unsafe to attempt complete extirpation. The patient recovered from the operation in two weeks, but six weeks later there was a recurrence of the tumor in the nose, and also extension of the growth into the cranial cavity.

CASE XXXVI.—Routier<sup>4</sup> reports a case of a man, aged 24, who suffered at first with what he thought was an acute coryza, the symptoms, however, did not disappear, and the discharge gradually became tinged with blood. Nasal stenosis soon became complete, and he began to have severe attacks of epistaxis, especially after violent exercise. The sense of smell became entirely lost. Examination revealed a tumor blocking up both nasal cavities, more especially the left. It could also be felt with the finger behind the palate. The disease

<sup>1</sup> *Revue Mensuelle de Laryngologie, etc.*, 1886, pp. 417-425.

<sup>2</sup> *Annal. des Mal. de l'Oreille, etc.*, March, 1887, vol. xiii., pp. 89-92.

<sup>3</sup> *N. Y. Med. Jour.*, March 12th, 1887, vol. xlv., p. 282.

<sup>4</sup> *Revue de Chir.*, 1887, p. 62.

had existed about thirteen months when he came under Routier's observation. The growth was removed by means of a curette, the finger being introduced through the mouth into the posterior nares, the palate having been divided vertically. Hemorrhage was profuse, but was controlled by pressure. There was no recurrence at the end of the month; no subsequent history of the case is given. It is interesting to note that *ozæna* developed after the operation; this being explained by Routier by the fact that the pressure of the growth had caused atrophy of the turbinated tissues, and in consequence the nasal cavities were more open than normally.

CASE XXXVII.—Ficano<sup>1</sup> reports a case of a patient aged 24, who had suffered from epistaxis for three months. Examination showed a moderate-sized pedunculated tumor, attached to the cartilaginous septum. The growth was not ulcerated, but bled easily on being touched. Its removal was effected by means of the cold snare. Microscopically, it was covered by a superficial layer of flat epithelium, the mass of the tumor being made up of spindle cells.

CASE XXXVIII.—Major<sup>2</sup> reports a case in which a growth the size of a pigeon's egg was removed from the triangular cartilage by means of the snare. The seat of origin was destroyed with the galvano-cautery. Microscopic examination revealed the growth to be a spindle-celled sarcoma. There was no recurrence at the end of four months.

In addition to these, the following cases have come under my own personal observation.

CASE XXXIX.—Was a male, aged 45, who came under my observation with a history of a growth in the nose, of comparatively slow development, which had existed for three years, and had been subjected to various plans of treatment, without arresting its development. Latterly there had been more or less violent attacks of epistaxis. When first seen, the nose was distorted, and completely blocked up by a dark bluish-gray, grumous-looking mass, which protruded from the left nostril. In connection with this, there was an offensive sero-sanguinolent discharge. Each attempt at removal was attended with violent hemorrhage. Notwithstanding this, the whole mass was removed by means of the cold snare, and the operations repeated at intervals of a week, until, at the end of six months, all tendency to recurrence had apparently disappeared. Four months later, however, recurrence took place, and the tumor grew with such rapidity that it became necessary to devise a more radical method of removal. He returned, therefore, to his home in Philadelphia, where he was subjected to Ollier's operation by Dr. Keen, and the growth extirpated. Recurrence took place at the end of about six weeks, death following soon after, from exhaustion. The growth was a round-cell sarcoma, attached at first to the left side of the perpendicular plate of the ethmoid, but subsequently extended to the cribriform plate, the turbinated bones, and to the tissues in the opposite nares.

CASE XL.—Was a male, aged 48, who for a number of years had had nasal polypi. He consulted me November 4th, 1887, with the history of an offensive discharge from the right nostril, together with a tendency to repeated attacks of hemorrhage, which had existed for eight months. Several polypi were removed in this case by the snare, when a dark, grayish, grumous mass was discovered, attached apparently beneath the middle turbinated bone of the

<sup>1</sup> Gazz. d'osp., Milano, 1888, ix., No. 12, p. 90.

<sup>2</sup> Journal of Laryngology and Rhinology, vol. iii., p. 164.



right side, which bled excessively with the slightest disturbance. In this case, after most of the growth was removed, it became necessary to abandon the snare, and resort to the galvano-cautery, on repeated applications of which the tumor was completely eradicated. At the end of a year, there has been no recurrence. The character of the growth was angio-myxo-sarcoma.

CASE XLI.—Was a gentleman, aged 47, who came under my care, with a history of having commenced to develop, two years previously, notable nasal stenosis, in connection with frequent attacks of epistaxis. This had been found to be due to the existence of a sarcoma, which had been operated on upon two occasions, followed by recurrence at the end of from three to six months. When first seen by myself, there was very extensive deformity of the nose, with a large reddish-yellow mass protruding from the nostril in front, and also extending into the naso-pharynx. Under the influence of ether, this growth was eradicated, as far as possible, by means of digital manipulation, in connection with the curette, the operation being attended with excessive hemorrhage. Subsequently, the passages were thoroughly gone over under ocular inspection, and every portion of suspicious tissue removed by the snare. This patient was kept under occasional observation, and no evidence of recurrence could be detected six months after the last operation. The character of the growth was an adeno-sarcoma, the attachment being upon the floor and outer wall, the turbinated bones being completely obliterated by pressure.

The above cases have been detailed somewhat at length, with the idea that a rapid glance over the salient features of these cases, offers much of information on a subject, which has not been exhaustively studied heretofore.

In addition to the above it should be stated that Kühn<sup>1</sup> has reported a case, which occurred in the practice of Theulot, in which a large growth had existed in the nasal passages for thirty years, in a man aged sixty-eight, which for five years had projected from the nostril, hanging down as far as the chin. Kühn reports this as a case of sarcoma, which was completely cured by an operation, although the diagnosis is open to serious question.

The same, I think, is to be stated in regard to Dalrymple's<sup>2</sup> case, also cited by Kühn, in which a similar growth was observed hanging from the nostrils, down to the upper lip, and which had existed for eleven years, the patient being a man aged forty-five. A radical operation is reported to have resulted in a complete cure.

ETIOLOGY.—As regards the etiology of the affection, these cases afford but little information. In the second of my own cases, the sarcoma seemed to develop after the polypi had been operated on rather harshly, by means of forceps, while in Schäffer's case the same conversion had taken place, apparently spontaneously, which

<sup>1</sup> "De tumoribus narium sarcomatosis." Vratislaviæ, 1835.

<sup>2</sup> Im Magazin der ausländischen Literatur der gesammten Heilkunde und Arbeiten des ärztlichen Vereines zu Hamburg. Herausgegeben von Dr. G. H. Gerson, März, April, 1835.

would seem to indicate the possibility of a spontaneous conversion of myxoma into sarcoma.

That catarrhal inflammation of the nose may predispose to sarcoma, is possibly true, and, furthermore, would seem to be indicated in the fact that out of thirty-eight of the above cases, twenty-two are males, and sixteen are females, catarrhal disease being more common in males, owing to the greater exposure to which they are subject.

A very noticeable feature of sarcoma of the nose, furthermore, is the age at which it seems to develop. Thus, in the above cases we find, while there were a few instances in elderly people, the very large proportion of them occurred earlier than the age of forty, the average being something less than thirty-nine, differing in this respect, in a very marked degree, from the clinical history of cancer, which develops, as a rule, late in life. We find, however, that the average duration of the above cases was three and two-thirds years, which would bring down this percentage somewhat, and also would seem to show that sarcoma runs a somewhat slow course when it develops in the nose.

**PATHOLOGY.**—The structure of sarcoma of the nose differs in no essential respect from the same morbid process as developed in other portions of the body, except in so far as it is modified by the special tissue from which it develops. It should be easily recognized by microscopical examination, and yet it must be borne in mind, that the normal membrane of the nose is exceedingly rich in lymphoid tissue, which oftentimes bears a somewhat confusing resemblance to the structure of round-celled sarcoma. In the third of my own cases (Case XLI.) the microscopic appearances were as follows: The growth was made up of connective tissue and of cells. The cells were of two kinds, round and ovoidal, and large granular cells. In some parts, the connective tissue fibres surrounded the cells in a manner suggestive of nests. This arrangement, however, was by no means constant, and on closer inspection, these nests were found to be lobules of the tumor. The surrounding connective tissue constituted the trabeculæ, dividing these lobules from each other. The mass of the growth, then, was made up of cellular elements. In certain portions, the normal gland structure of the membrane had undergone a proliferation. In other words, a portion of the growth presented all the characteristics of an adenoma. The growth was therefore an adeno-sarcoma. See Fig. 115.

In the second case (Case No. XL.) the growth was composed almost entirely of cells, some round, others the characteristic stellate mucous cell. In this case, the walls of the blood-vessels were

entirely lost, their place being supplied by large vascular spaces, running between the cells, the growth corresponding in microscopical character to angio-myxo-sarcoma, apparently much the same thing as Kolaczek<sup>1</sup> designates as a perivascular sarcoma.

In my first case (Case No. XXXIX.) the appearances found on microscopical examination were as follows: In some places, the tissue consisted of tubular glands, lined by columnar ciliated epithelium, closely packed together, to such an extent that but little connective tissue was seen between the tubules. This connective tissue was convoluted in all directions, and carried scanty capillary blood-vessels. This portion of the tumor was therefore an adenoma. Other portions, however, showed the connective tissue

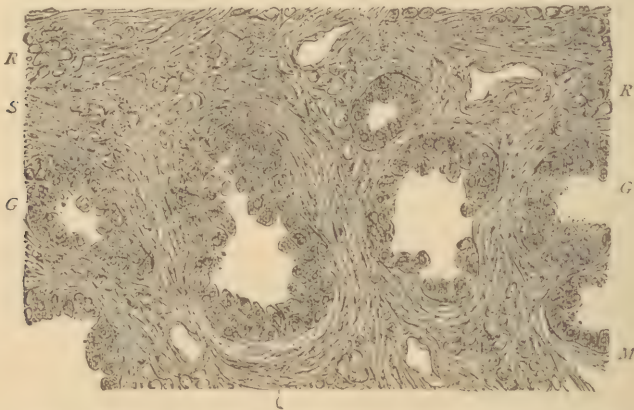


FIG. 115.—Adeno-Sarcoma of the Nasal Mucosa. Case III. of the author (Case No. XLI.) *G, G*, hyperplastic glands; *R, R*, globular sarcoma corpuscles; *S*, Spindle-shaped sarcoma corpuscles; *M*, membrana propria transformed into spindle cells.

between the tubular glands much augmented, and crowded with globular sarcoma corpuscles in all stages of development: a section from this portion of the growth is shown in Fig. 116, still other portions exhibited but scanty remnants of tubular glands. It is interesting to note, that as the case progressed, subsequent histological investigation showed that the glandular elements entirely disappeared from the growth, which assumed the appearance of a typical, round-cell sarcoma.

The ordinary round-celled or spindle-celled sarcoma, differs in no essential respect from the above, other than in the absence, in the one case, of the glandular, and in the other, the myxomatous elements.

In the so-called melano-sarcoma, the color is due to the deposit of pigment in the cells, and in part, perhaps, to minute blood ex-

<sup>1</sup> Loc. cit.



travasations, while in fibro-sarcoma we have a mixture of sarcomatous cells, with fibrous connective tissue, in varying proportions. The surface of the growth is sometimes covered with flattened epithelium, as in Calmettes' and Chatellier's case, which might prove misleading, did we not recognize the fact, that this appearance is due to the mechanical pressure upon the normal columnar epithelium.

**SYMPTOMATOLOGY.**—The prominent symptom of the presence of a sarcomatous growth, as of every nasal tumor, is in the obstruction of nasal respiration. Coincident, however, with this symptom, in the large majority of cases, occurs epistaxis, of a more or less violent character. This symptom seems to be strikingly character-

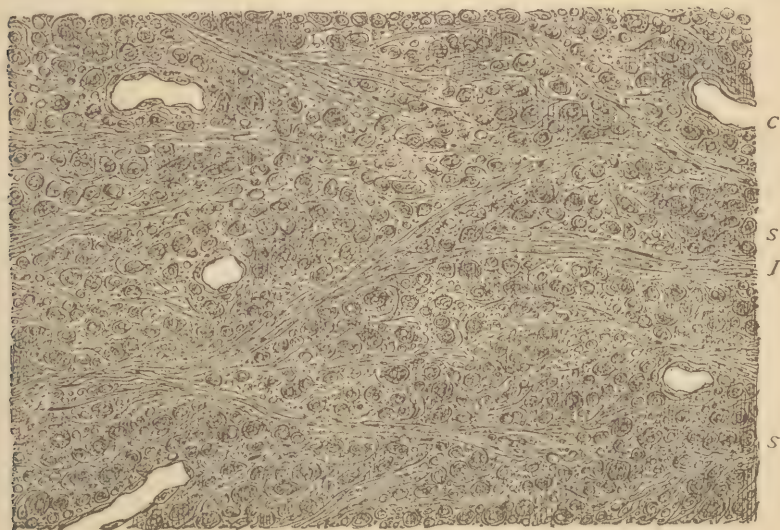


FIG. 116.—Round-cell Sarcoma. Case I. of the author. (Case No. XXXIX.) S, S, globular bodies of varying sizes; J, scanty tracts of fibrous connective tissue; C, capillary blood-vessel.

istic of sarcoma, as also of fibroid. In both these forms of growth, the hemorrhage is probably due, in many cases, to an erosion of the mucous membrane of the nose, by the pressure of the tumor. In the sarcoma, however, I believe it is not infrequently due to an escape of blood from the growth itself, especially where the tumor presents a prominent angiomatous character.

The discharge from the nose is of a sero-sanguinolent character, and usually gives rise to quite an offensive odor. The factor is undoubtedly due to retention of secretion, with decomposition of its organic constituents; while the source of secretion is mainly in the mucous membrane of the nose, and possibly, in part due to transudation from the growth itself.

Deformity of the nose depends on the size and consistency of

the growth, although a very soft and flabby tumor may produce no inconsiderable deformity, crowding the septum to one side, and forcing out the lateral walls of the external nose, both the cartilaginous and the bony.

DIAGNOSIS.—The gross appearance of the growth presenting in the nasal cavity, is a bluish-gray surface, with a soft flabby consistency, which should in all cases excite suspicion of the existence of a malignant disease, especially in connection with the repeated hemorrhages, which so frequently occur in these cases. The diagnosis, however, will always depend upon the microscopic examination of a portion of the growth, which will reveal not only its character, but to a certain extent, the clinical tendencies. Furthermore, impact upon the growth with a probe will show it to be, to a certain extent, movable in the nasal cavity, as the tumors are invariably pedunculated. Mackenzie<sup>1</sup> makes the statement that their usual attachment is to the septum, but we find them springing with about equal frequency from both the outer and the inner wall of the cavity. They occur, usually, as a single tumor, although Weber<sup>2</sup> makes the rather curious statement, that sarcoma is usually accompanied by several deposits of the same neoplasm, in neighboring regions. Certainly, there is no clinical evidence to support this view, and moreover, at the time Weber made this statement, the whole literature of nasal sarcoma was based on but few cases.

PROGNOSIS.—An analysis of the cases above reported, would seem to indicate that about half of the cases recovered, and yet I am disposed to think that the prognosis is not so favorable, as our knowledge of the subsequent history of those cases is not sufficiently definite to warrant us in the conclusion that the disease was eradicated. Thus, in Mason's case, our latest report is four months after the operation; in Weinlechner's, one month; in Terrier's two months, etc., and, furthermore, in some of the cases reported as cured, the time which had elapsed since the operation is not given at all. Hence, I think it is scarcely safe to say that so large a proportion of cases recovered, as a result of the operation, and yet sarcoma in the nose apparently does not present the same malignant tendencies as it does when found in other localities. In many instances, its progress is extremely slow, and apparently is arrested with ease. It should be stated in regard to many of the cases above reported, that even good results were accomplished by operative measures, which were not done with the nicety of manipulative skill which we now possess in treating cases of intra-nasal disease. Age seems to exercise a certain amount of influence on the prognosis of these cases, in that in advanced life the disease is

<sup>1</sup> Op. cit.

<sup>2</sup> Loc. cit.

less amenable to operative interference than in youth. Aside from these considerations, our prognosis must be based on the extent of the disease, its duration, and especially on its apparent rapidity of growth. The character of the growth has an important bearing on the prognosis, in that a round-cell sarcoma is to be regarded as more malignant in its tendencies than the other varieties. Thus, in the cases reported above, all of those in whom a cure was effected, and where the microscopic character of the growth was known, were composed of other than round-cell tissue. In those cases where we find the sarcomatous elements intermingled with the normal tissue elements, as in fibro-sarcoma, myxo-sarcoma, adeno-sarcoma, etc., the prognosis is rendered less grave as the proportion of the normal elements increases in the tumor. The melanotic or angiomatous character of the neoplasm does not modify the prognosis, otherwise than that the latter growth may be attended with excessive hemorrhage.

TREATMENT.—There are no local applications which have the slightest effect on a sarcomatous tumor in the nose. The only treatment is the thorough and complete eradication of the growth, and this at the earliest period possible, without regard to the character of the tissue. If there is a marked hemorrhagic disposition, as in the angiomatous tumors, the operation should be proceeded with as rapidly as possible, without regard to the hemorrhage, as this complication can be controlled, when its arrest becomes necessary. Furthermore, I think, ordinarily, the growth should be removed through the natural passages when it is feasible, although if better access to the nasal cavities is demanded, an operation on the external nose does not necessarily complicate the final result. The growth may be extirpated by the curette, spoon, the cold snare, or the galvano-cautery loop. As a rule, these growths are exceedingly soft and friable, and their removal is not a thoroughly surgical procedure in its details. Probably the cold wire loop, properly manipulated, affords the best method of removing the small tumors, and the larger growths, even, may be removed piecemeal by this method. This manipulation, certainly, is easier of accomplishment than the application of the galvano-cautery loop; and furthermore, I think it is a nice question oftentimes, whether the galvano-cautery should be used, as I am convinced, from my own personal experience, that it may stimulate a sarcomatous tumor to renewed activity of growth. The essential thing is to get rid of the growth, and that as rapidly as possible, and the special instrument used is not a matter of great importance, but will be dictated by the choice and special manipulative skill of the operator. The most serious obstacle met with in these operations,



is always the excessive hemorrhage. This is probably true in all varieties of sarcoma, and especially so of the angiomatous growths. The source of the hemorrhage is always from the tumor itself, and the indications are to get the growth out as rapidly as possible, and to get down to its attachments. When this part is reached, the hemorrhage, as a rule, ceases at once. In a rapid operation, then, either bimanual manipulation, by means of one finger in the nostril and one in the nares, will be resorted to, or the curette will be used through the nostril, its manipulation being aided by the finger in the posterior nares. Routier,<sup>1</sup> in order to facilitate this manipulation, made an incision through the soft palate; entirely unnecessarily, I think. In operating in this way it is necessary that the mouth should be held open by a mouth-gag, while an assistant stands ready to prevent the blood from flowing down into the larynx and trachea; although in many cases the choanæ are sufficiently plugged by the growth itself, until the posterior attachments are thoroughly severed, after which, by tilting the head forward, the blood makes its escape from the anterior nares. After the growth has been removed, the subsequent hemorrhage is easily controlled, by packing the nose with one or more small sponges.

The primary operation on these growths I regard as but the commencement of treatment, the more important part being the subsequent close watching of the cavity, to arrest and control any tendency to a reappearance of the growth. This watchfulness should be maintained for a prolonged period of time, at intervals of from one week to a month, until certainly from one to two years have elapsed. In those cases where the growth develops rapidly after operation, these minor operations must be repeated with greater frequency, according to circumstances.

As regards the advisability of cauterizing the base of the tumor, by means of the galvano-cautery, or some one of the various chemical agents, I think this is oftentimes not only uncalled for, but mischievous, while in other cases their use would seem to be attended with the best of results. The only indication here, then, will be that any caustic agent for the control of sarcomatous recurrence, must be used with the greatest possible care, and its immediate effect watched.

The primary operation is usually accomplished with a considerable degree of rapidity, and hence, if a general anæsthetic becomes necessary, the first stage of chloroform anæsthesia is quite sufficient in duration for the accomplishment of the procedure. Of course, where the growth is smaller, local anæsthesia with cocaine is all that will be required.

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<sup>1</sup> Loc. cit.

## CHAPTER XXXVII.

### CARCINOMA OF THE NASAL PASSAGES.

It would seem that there is nothing in the morbid process which constitutes catarrhal inflammation, which favors the development of malignant disease, for while inflammatory action of the nasal mucous membrane is one of the most frequent of diseases, I think Grynfeldt's<sup>1</sup> view must be accepted, that a malignant disease in this region is one of the rarest conditions. That it does occur, however, as a primary disease in the nasal cavity, can scarcely be questioned, notwithstanding the assertion of Cornil and Ranvier<sup>2</sup> that there is no well-authenticated case of primary carcinoma of the nose. That it should be so rare in this region is probably due in some degree to the fact that the nasal mucous membrane, inclosed within its bony walls, is so thoroughly protected from any constantly acting traumatic or directly irritating influences. Thus, as we have seen in regard to the mild form of malignant disease, which takes the direction of a sarcomatous tumor, the whole literature of the subject embraces but a limited number of cases, while as regards carcinomatous disease, the number of cases which the literature affords is even smaller. As was done in the chapter on sarcoma, so in treating carcinoma, a brief résumé of the cases reported is given, as affording perhaps a more graphic account of the disease in its various clinical features. That carcinoma may have its primary origin in the nasal cavity, I think, cannot be questioned, in face of the testimony of the following cases:

CASE I.—Reported by Seeliger.<sup>3</sup> A male, aged 60, presented with a history of a growth in the nose, dating back about three months, which had given rise to stenosis and moderate discharge, together with severe left facial neuralgia. No attempt at removal was made, and the growth slowly developed, giving rise to marked facial deformity, together with attacks of epistaxis, and an exceedingly offensive discharge. The patient died a year after the first appearance of the growth. The malignant character of the disease was evidenced by its clinical history.

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<sup>1</sup> Montpellier Médicale, 1876, vol. 37, p. 515.

<sup>2</sup> "Manuel d'Histologie Pathologique," Paris, 1869, p. 656.

<sup>3</sup> "Beobachtungen und Abhand. aus dem Gebiete prak. Heilk. von Oesterr. Aerzten," Wien, 1824, vol. iv., p. 469.

CASE II.—Reported by Earle.<sup>1</sup> A male, aged 48, by occupation a sailor, was admitted to St. Bartholomew's Hospital, with a history of epistaxis eighteen months previously, followed soon by the discovery of a tumor in the nose, which was removed by forceps, an operation which had been repeated twenty-three times, previous to his admission to the hospital, at which time there was external deformity, with a grumous mass protruding from the nose. Access to the cavity was obtained by splitting the external nose in the median line, and the tumor removed and its base cauterized. Recurrence took place at the end of forty days, followed by death a month later. The autopsy showed the tumor to have had its origin in the vomer, cribriform plate, and superior turbinated bone. The growth was designated as a fungoid tumor, although its carcinomatous character was clearly evidenced by the fact that secondary deposits were found in the liver, lungs, cellular tissue of the abdomen, and perinephritic tissues.

CASE III.—Reported by Hecker.<sup>2</sup> A female, aged 46, presented with a history of nasal stenosis, dating back three years, as the result of a tumor, which had given rise to repeated attacks of epistaxis, with notable neuralgic pains. Several operations had been done, followed by a recurrence. The nose was opened by external incisions, and the growth extirpated by means of the scissors and knife. It was found to be attached to the septum, extending well forward, involving the ala of the nose. Recurrence took place in the nasal cavity at the end of a few months, and the disease rapidly extended to the lip and cheeks, rendering further operative procedure hopeless.

CASE IV.—Reported by Pemberton.<sup>3</sup> A boy, aged five, presented with a history of nasal polypi, dating back eleven months, and which had been operated on with forceps previous to his admission to the hospital. When first seen, both nostrils were completely filled with a grumous mass, which projected into the pharynx posteriorly. The growth was removed by means of the forceps, and had the appearance of a medullary cancer. At the end of three weeks the disease recurred, and was again operated on, followed by the death of the patient on the operating table. Post-mortem examination showed that the tumor had its origin in the nasal passage, and had successively invaded the antrum, ethmoid and sphenoid cells. This case was reported as a case of medullary cancer, although the diagnosis is open to serious question, as from the age of the patient it is more likely to have been a case of sarcoma. No microscopic examination was made of the tissue.

CASE V.—Reported by Lawrence.<sup>4</sup> A male, aged 64, presented with a history of a growth in the nose, dating back six months, which resulted in complete stenosis of both nostrils, with notable external deformity. Access to the cavity was obtained by a modification of Chassaignac's operation, and the growth extirpated. It had produced absorption of the nasal bones, and was found to be confined entirely to the nasal cavity. Recurrence took place at the end of a month, the subsequent history not being given. The diagnosis of carcinoma was made from the gross appearances.

CASE VI.—Reported by Neudörfer.<sup>5</sup> A female, aged 31, presented with a history of nasal stenosis, of eleven years' standing, with notable external

<sup>1</sup> London Med. Gaz., 1827-28, vol. i., pp. 159-161.

<sup>2</sup> Arch. für Physiologische Heilkunde, 1844, iii., p. 260.

<sup>3</sup> Provincial Med. and Surg. Journal, 1850, p. 519.

<sup>4</sup> Lancet, 1856, vol. i., p. 455.

<sup>5</sup> Oesterreich. Zeitschrift für prakt. Heilk., Wien, 1858, iv., p. 305.



deformity, dating back three years. On examination, there was found a dense tumor, apparently continuous with the septum, completely occluding both nares, giving rise apparently to stenosis, with anosmia and deafness. The glands at the angle of the jaw were notably enlarged. Access to the cavity was gained by an external operation, when the tumor, about the size of a small walnut, was removed, which was found, upon microscopic examination, to consist of medullary carcinoma. The subsequent history was not given.

CASE VII.—Reported by Liebl.<sup>1</sup> A male, aged 50, received an injury of the external nose, at the age of 37, which healed within two years, leaving an ulceration at the angle of the right eye, which was operated upon unsuccessfully; soon after which, a growth appeared in the nasal cavity proper, as evidenced by pain, external deformity, and nasal stenosis with exophthalmos. Access to the cavity was obtained by an external operation, and the growth removed. The subsequent history is not given. The diagnosis of medullary cancer was made, based on the gross appearances of the tumor.

CASE VIII.—Reported by Fleury.<sup>2</sup> The patient was a male, 20 years of age, with no family history of malignant disease. In July, he was suddenly seized with pain in the right side of his face, and a few days after, noticed an increase in size of the nose, in the region of the right ala. Steadily increasing nasal stenosis became a prominent symptom, and in September there was exophthalmos, and the neoplasm could be felt by the finger passed behind the palate.

In the latter part of September, a violent cellulitis of the face supervened, giving rise to an abscess at the root of the nose, from which there was purulent discharge. The patient grew steadily worse, there was difficulty in deglutition, symptoms of compression came on, and the patient died on the 5th of October. An autopsy revealed a tumor, involving the cribriform plate and lateral masses of the ethmoid, and the body of the sphenoid. Pressure on the brain in this region had given rise to the symptoms of compression. The frontal sinus was opened, and the orbital and cranial cavities communicated in this way. There was no glandular enlargement. No microscopic examination was made of the growth, which was called a "*polype fongueux*" (*cancereux*).

CASE IX.—Reported by Gosselin.<sup>3</sup> This was the case of a male aged 58, who for several years had suffered from a tumor in the nose, which had given rise to attacks of violent epistaxis, with nasal stenosis and external deformity, together with exophthalmos. Two operations had been done, followed by recurrence. Gosselin split the nose in the median line, and extirpated the growth, which was found to consist of an epithelio-glandular polyp. The subsequent history was not reported.

CASE X.—Reported by Waldeyer.<sup>4</sup> This is a case of a female, aged 50, operated upon by Middledorpf, for a tumor the size of a walnut, involving the septum narium, which the microscope showed to be typical carcinoma. The further details were not published, this being simply one of the illustrative cases which Waldeyer made use of, in his well-known series of papers on the development of cancer.

CASE XI.—Reported by Watson.<sup>5</sup> A female, aged 60, presented with a history of having suffered apparently from ordinary nasal polypi, of some years'

<sup>1</sup> Allg. Wien. Med. Zeit., 1861, vol. vi., p. 188.

<sup>2</sup> Gaz. des Hôp., 1863, p. 522.

<sup>3</sup> Gaz. des Hôpitaux, 1865, vol. xxxviii., p. 46.

<sup>4</sup> Virchow's Archiv, 1872, vol. lv., p. 93.

<sup>5</sup> "Diseases of the Nose," London, 1875, p. 287.

standing, which gave rise to a muco-purulent discharge. A few months previously, there had developed exophthalmus, with lachrymal abscess. A portion of the polypoid mass was removed, which was found to be epithelioid in character. No radical operation was done, and the patient died within the year. There was no autopsy.

CASE XII.—Reported by Watson.<sup>1</sup> Watson also reports a case of a child, four years old, from whose nasal cavity Brodie removed a malignant tumor. The disease reappeared in various parts of the body, resulting in death at the end of six months. An autopsy revealed the growth to have originated within the nasal cavity, and successively to have invaded the antrum, cerebral surface of the frontal bone, the sphenoid, and the cribriform plate. The brain was healthy.

CASE XIII.—Reported by Agnew.<sup>2</sup> A boy, aged eight, presented with a history of nasal tumor, dating back one month, giving rise to external deformity, with exophthalmos, and enlargement of the veins of the face. The case was hopeless when first seen, and portions of the growth were removed by forceps, as a palliative measure. The diagnosis of encephaloid cancer was made. No subsequent history is given.

CASE XIV.—Reported by Péan.<sup>3</sup> A female, aged 42, presented with a history of a nasal tumor dating back eighteen months, giving rise to frequently repeated attacks of violent epistaxis. An operation was done, and the growth removed by forceps, followed by recurrence. When first seen by Péan, there was complete stenosis, with external deformity, exophthalmos and severe headache. A modified Ollier's operation was now done, and the growth extirpated, followed by sudden death from brain symptoms, two months later. The autopsy showed that the tumor had invaded the frontal sinus, the posterior wall of which was perforated, giving rise to pressure on the brain. No microscopic examination was given, but the carcinomatous character of the tumor was evidenced by the secondary deposits in the liver and kidneys.

CASE XV.—Reported by Casabianca.<sup>4</sup> A male, aged 52, had noticed for two years a prominence in the left nostril, which gave rise at first to a pricking sensation, but later to stenosis. Fifteen days after the tumor appeared, he noticed an enlargement of the left submaxillary gland. Seventeen months later, the nasal growth had given rise to ulceration, and a purulent discharge from the nostril. The nose was opened by Verneuil's operation, and the tumor extracted, and the infiltrated gland was also removed. Recurrence took place, and the patient finally succumbed, without further interference being attempted.

CASE XVI.—Reported by Péan.<sup>5</sup> A female, aged 64, for five months had suffered from a tumor in the right nostril, situated on the septum, which had given rise to sneezing, stenosis, and later, to anosmia. This growth continually increased in size, giving rise to external deformity, especially of the right side. The nasal cavity was opened by Linhart's operation, and the growth extirpated, but recurred at the end of four months, giving rise to very great deformity, together with violent headache and cachexia. A second operation was done, during which the septum, portions of the nasal bones, and the superior maxilla, were taken away. The operation was unsuccessful in extirpating all of the growth, and the patient succumbed soon after.

CASE XVII.—Reported by Eder.<sup>6</sup> A male, aged 66, in December, 1876,

<sup>1</sup> Op. cit., p. 286.

<sup>2</sup> Phila. Med. Times, vol. v., 1875, p. 612.

<sup>3</sup> Lancet, 1876, vol. ii., p. 85.

<sup>4</sup> Thèse de Paris, 1877.

<sup>5</sup> Cited by Casabianca, op. cit.

<sup>6</sup> Aertz. Bericht der Privat-Heil-Anstalt des Dr. Eder, 1877, Vienna, 1878, p. 46.

commenced to suffer from exophthalmos and double vision, followed by anosmia. A few months later, he had a violent attack of epistaxis from the left nostril, after which he was seen by Eder, who discovered a tumor in the nasal cavity, which having its origin on the left side, had extended to the opposite side, apparently around the septum. There was also discovered a small orbital tumor at the inner canthus of the left eye. Access to the cavity was obtained by chiseling away a portion of the nasal and lachrymal bones, together with the nasal process of the superior maxilla, when the growth was removed with a sharp spoon. It was found to involve the frontal, ethmoidal, sphenoidal, and maxillary sinuses. Examination revealed the tumor to be a melanotic carcinoma. The patient died two days later, of meningitis.

CASE XVIII.—Reported by Weinlechner.<sup>1</sup> A male, aged 56, presented with the history of nasal stenosis, of three years' standing, due to the presence of a growth, which had given rise to epistaxis, and latterly to exophthalmos. Two attempts at removal had been made through the natural passages, without success. An external operation was decided upon. Access to the nasal cavity was obtained by the removal of a portion of the anterior wall of the superior maxilla, and the growth removed, and found to be a melanotic carcinoma, springing from the outer wall of the nose, and invading successively the sphenoid, ethmoid, maxillary, and orbital cavities. Recurrence took place, which required a second operation, eight months later, which was incomplete, on account of the danger of invading the cranial cavity. The patient left the hospital in a week, and no further history was recorded.

CASE XIX.—Reported by Heurtaux.<sup>2</sup> A male, aged 40, presented with the history of a nasal growth, dating back twelve months, which had given rise to repeated attacks of epistaxis. A tumor was removed from the nasal cavity, and found to be an encephaloid carcinoma.

CASE XX.—Heurtaux<sup>3</sup> gives a very imperfect history of another case, in which, as the result of a fall, a tumor developed in the left nostril, its attachment being the septum. It was found to be a lobulated epithelioma, made up of large nucleated cells.

CASE XXI.—Reported by Pepper and Shakspeare.<sup>4</sup> A female, aged 73, presented with a history of having suffered some months from a discharge from the naso-pharynx, which soon assumed a sero-sanguinolent character, followed soon by a growth which pressed against the soft palate, causing a notable protuberance. This was treated by injections of ergot, with a moderate amount of relief, although subsequently the general health became notably impaired, attended with limitation of the field of vision of the right eye, with weakness of the ocular muscles, together with deafness in the right ear. Death occurred seven months after the tumor was first noticed, no operation having been attempted. The post-mortem examination showed that the growth, which was a lobulated epithelioma, involved the right nasal fossa, sphenoid and ethmoid cells, and the meninges of the brain.

CASE XXII.—Reported by Campbell.<sup>5</sup> A male, aged 54, following an injury to the right eye, three years previously, had developed a tumor in the nose,

<sup>1</sup> Bericht der k. k. Krankenanstalt Rudolph Stiftung in Wien (1877), Vienna, 1878, p. 315.

<sup>2</sup> Soc. Anat. de Nantes, Séance March 13th, 1878; Bull. Soc. Anat. de Nantes, Paris, 1879, p. 87.

<sup>3</sup> Op. cit., p. 68, Séance Feb. 12th, 1879.

<sup>4</sup> Trans. Path. Soc. of Phila., 1880, vol. ix., pp. 138-144.

<sup>5</sup> Brit. Med. Journ., 1880, vol. i., p. 325.



attended by external deformity with swelling of the face, together with a sero-sanguinolent fetid discharge. When first seen, the nasal growth completely filled the right nostril, and protruded into the pharynx. Access to the tumor was obtained by removal of the superior maxilla, together with the hard palate and orbital plate. The growth was enucleated, and found to be a glandular carcinoma, having its origin in the upper portion of the nasal cavity. There was no recurrence at the end of six months. The microscope revealed the neoplasm to be composed of mucous glands, lined with cylindrical epithelium, or the glandular carcinoma, first described by Billroth, which, he asserts, possesses no marked disposition to recurrence.

CASE XXIII.—Reported by Heurtaux.<sup>1</sup> Heurtaux presented as a specimen before the Pathological Society of Nantes, a tumor, which he had removed from the nasal cavity of a woman, aged 57, the growth having, according to the report, persisted for fourteen years. He describes the growth as a tubular epithelioma. This also was probably the cylindrical carcinoma of Billroth. The subsequent history was not given.

CASES XXIV., XXV. and XXVI.—Reported by Schäffer.<sup>2</sup> A male, aged 45, suffered from an epithelial carcinoma of the anterior nares, which was removed by means of the curette, followed by death a year later. Schaffer's second case was a man, aged 28, who suffered from an epithelial carcinoma of the mucous membrane of the left inferior turbinated, which was operated upon in 1879. Recurrence took place in 1880, followed by death in 1881. In his third case, there was epithelial carcinoma of the right side, extending to the lachrymal canal, in a man, aged 57, complicated by the existence of mucous polypi on both sides.

CASE XXVII.—Reported by Delstanche.<sup>3</sup> A male, aged 53, presented at the clinic on account of nasal stenosis and deafness, with no other notable subjective symptoms. Examination revealed the presence, in the left naris, of a reddish, liver-like mass, which completely filled the cavity, and bled easily to the touch. A piece of this was removed, and subjected to microscopical examination, which revealed it to be a pavement-cell epithelioma. No operation was attempted, and the patient lingered on, and finally died, eighteen months later, having developed in this time considerable deformity of the external nose and face, with exophthalmos, together with a sanious discharge. An autopsy showed that the growth had its origin in the roof of the left nasal cavity, and had invaded successively the sphenoid and ethmoid cells, and the base of the brain.

CASE XXVIII.—Reported by Butlin.<sup>4</sup> A male, aged 44, presented with a small, wart-like growth, about the size of a hazelnut, attached to the inner aspect of the ala of the nose, about two-thirds of an inch from the muco-cutaneous junction. This was removed with the snare, followed by a recurrence, three weeks later, when the whole ala of the nose was removed. Examination revealed the growth to be a squamous-celled epithelioma. The subsequent history is not given.

CASE XXIX.—Reported by Schmiegelow.<sup>5</sup> A male, aged 51, presented with

<sup>1</sup> Bull. Soc. Anat. de Nantes, Paris, 1881, p. 96, Séance Nov., 1880.

<sup>2</sup> Cited by Schmiegelow, loc. cit. (I fail to find any report of these cases, although Schmiegelow notes them as having been published in the Deut. Med. Wochenschrift, 1882, No. 3.)

<sup>3</sup> Annal. des Mal. de l'Oreille, etc., July, 1884, No. 3, vol. x., p. 129.

<sup>4</sup> St. Bartholomew's Hospital Reports, vol. xxi., 1885, pp. 147-152.

<sup>5</sup> Rev. Mens. de Laryngologie, 1885, v., 421.

the history of an apparent cold in the head three months previously, which was followed by the development of a growth, giving rise to stenosis in the left side. It was attended with a puro-sanguinolent, acrid discharge. When first seen, Schmiegelow discovered the lower turbinated on the affected side to be partially destroyed, and partially transformed into a tumor, the size of a nut, while the middle turbinated, and the upper portion of the septum, were found to be transformed into an ulcerated mass of the same character. The diseased tissue was removed by means of the cold snare, together with free use of the galvano-cautery. The process involved a course of treatment of seventeen days. At this time the patient was discharged. Four months later, examination revealed the passage to be in a fairly healthy condition. Schmiegelow reports the growth to have been a cylindrical-celled carcinoma. It was, most probably, the glandular carcinoma of Billroth.

The following case came under my own observation.

CASE XXX.—A male, aged 56, presented with the history of violent pains, involving the whole left side of the head, dating back six months, while two months previously, there had set in complete stenosis of the left naris, with

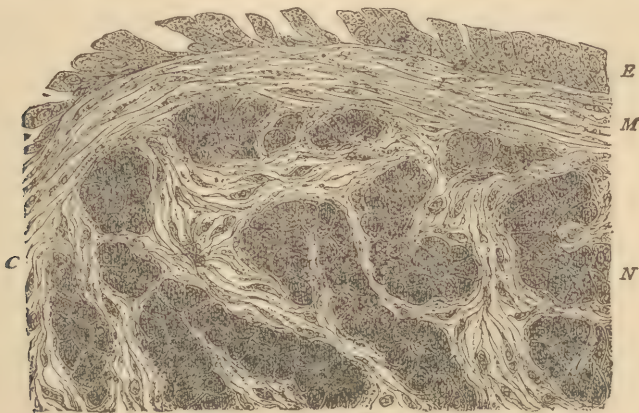


FIG. 117.—Scirrus of the Nasal Cavity. Case No. XXX. observed by the author. *E*, Columnar epithelium; *M*, mucosa transformed into dense fibrous connective tissue; *N*, epithelial nests; *C*, loose fibrous connective tissue between cells, showing incipient infiltration.

muco-sanguinolent discharge, of a decidedly acrid character. The general health was somewhat impaired, and for a month back the patient had noticed a swelling in the left submaxillary region, which he thought was somewhat on the increase. Examination of the nose showed the left passage to be filled with a growth, which seemed to have its attachment beneath the middle turbinated bone, which, apparently by pressure, had given rise to necrosis of the vomer. The rhinoscopic mirror showed the posterior nares of that side completely filled with a soft, grumous-looking mass. In the submaxillary region, there was a large mass of enlarged glands, which presented the peculiar dense, nodulated feeling, characteristic of secondary cancerous infiltration. A piece of the growth was removed by the cold snare, and being subjected to microscopic examination, it was found to consist of a connective-tissue frame-work, inclosing nests of large flat epithelial cells, as shown in Fig. 117. This frame-work was so abundant, that in many sections the epithelial structure was not found. The preponderance of connective tissue classed the growth as an

epithelioma of the scirrhus variety. The case seemed to be one in which an operation was unwarranted; hence, the patient returned to his home, where he died, three months later, from exhaustion. No autopsy was made.

ETIOLOGY.—It is a very easy matter, after malignant disease has developed, to trace its origin back to some injury received in previous years, and yet to connect the injury in a direct positive relation with the development of the cancer, is by no means so easy a matter. Hence, when we say that a cancer may be due to traumatism, it is a suggestion, not clearly warranted by clinical observation. In Liebl and Campbell's cases, the disease would seem to have been the result of injury, and yet not directly, for in the former, the injury to the nose resulted in a fracture of the nasal bones with necrosis, which produced a long-continued ulcerative action, which finally assumed a malignant character, although in Campbell's case the carcinoma would seem to have been really the direct result of the injury. This, however, is entirely too rare an event, to warrant the conclusion that traumatism acts as other than a possible predisposing cause of malignant disease.

In none of the cases above reported, has hereditary influence been mentioned, and yet we all recognize the fact, that this element is the one powerful predisposing cause of the disease. Aside from this consideration, I do not think we know why malignant disease occurs.

The question of the transformation of a benign into a malignant growth, has already been discussed in the chapter on nasal polypi and need not be entered upon in this connection, further than to repeat, that whereas there is a certain amount of clinical evidence to show that a nasal polyp may be transformed into a sarcoma, when subjected to unwarrantably harsh interference, such as with the forceps, yet there is no ground for supposing that a carcinomatous transformation ever takes place. In Péan's case, there might be a suggestion of this transformation, and yet the clinical history would seem to indicate that the carcinoma developed primarily, and that the growth of the nasal polypi was an adventitious feature of the cancerous development.

As regards the age at which the disease develops, cancerous deposits in the nose follow the same course as in other parts of the body, occurring, as a rule, after middle life.

In Cases IV., XII., and XIII., the disease occurred in childhood, presenting rare exceptions to the rule; aside from these, and the rather doubtful cases of Neudorfer (VI.) and Schäffer (XXV.), we find that the disease occurs from forty to sixty years of age, the majority being above fifty.

*PATHOLOGY.*—Carcinoma of the nose, from a pathological point



of view, presents no characteristics which differ from the same form of tumor in other portions of the body. Hence, a full description of the minute pathology of these growths need not be given here. An interesting clinical observation is made by Verneuil,<sup>1</sup> who states that a malignant growth, occurring within half an inch from the muco-cutaneous junction, is liable to be of the squamous epithelial variety, whereas, if it occurs beyond this line, it is of the epithelio-glandular variety. Inasmuch as the recognition of a cylindroma throws a great deal of light, not only on the prognosis, but clinical indications, a full description of this form of neoplasm becomes of importance. Whereas, the typical epithelioma is composed essentially a connective-tissue framework, wherein the alveoli are lined with either epithelium or endothelium, in a cylindroma, on the other hand, the connective-tissue structure seems to be obliterated almost entirely. The tumor is alveolar in structure, and yet the alveolar walls are composed almost entirely of epithelial structures, whereas the spaces represented by the alveoli are filled up with colloid material. In addition to this, there will be observed little tooth-like processes, as it were, of the epithelial structure, encroaching upon or projecting into the central colloid masses. We have thus a structure, not unlike a sponge, the spaces of the sponge being represented by the colloid masses, whereas the solid portion of the sponge is represented by the epithelial structures.

**SYMPTOMATOLOGY.**—There is nothing in the development of a malignant growth in the nose, to specially suggest the character of the disease other perhaps than the peculiar sero-sanguinolent acrid discharge. Epistaxis occurs in a certain proportion of cases, but perhaps not so frequently as is the case with sarcoma of the nose. Pain, which is usually so prominent a symptom of the development of cancer elsewhere, does not seem to be characteristic of the disease when met with in the nasal passages. Nasal stenosis, with deformity of the external nose, of course, is present, according to the duration and extent of the disease. As the tumor invades the sphenoid and ethmoid cells, we have the symptoms characteristic of disease in these cavities, such as exophthalmos, impairment of vision, etc.

Enlargement of the lymphatic glands does not seem to be a frequent concomitant of the disease, although noted in Cases VI. and XXX., thus following the rule observed in connection with cancer of the larynx; although the direct connection between the cervical glands and the nasal mucous membrane is probably more

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<sup>1</sup> *Gaz. des Hôpitaux*, Paris, 1885, vol. lxxviii., p. 269.

direct than is the case with the larynx. Maisonneuve<sup>1</sup> does not find the submaxillary glands enlarged in intra-nasal carcinoma, unless the antrum is involved, with infiltration of the skin in the infraorbital region. The cancerous cachexia is to be observed, of course, late in the disease, although not constituting a symptom of any special value.

In Cases II. and XII., secondary carcinomatous deposits were found in certain of the viscera on autopsy, although not giving rise to any symptoms which led to their recognition before death.

DIAGNOSIS.—The ordinary symptoms of malignant disease of the nasal cavities are of sufficient prominence to render the diagnosis, based on the objective symptoms, a comparatively easy matter. With our present methods of examining the nasal cavities, however, a growth should always be recognized very early in its development, when a small portion can be removed for examination with the microscope, which will reveal its character. This removal should in all cases be accomplished by means of the cold wire snare, as avoiding any unnecessary harshness in manipulating the growth, whereby a renewed activity of development might be stimulated. As we have seen, in sarcoma secondary enlargement of the cervical glands is never present. In carcinoma, however, this symptom seems to be present in a few cases, as is shown in Neudorfer's case, as well as my own. In Neudorfer's case, this seemed to be developed late in the disease, whereas in my own, this symptom manifested itself quite early. The absence, then, of secondary infiltration would seem not to possess any special diagnostic significance. Epistaxis would seem to be quite as characteristic of carcinoma as of sarcoma, although in the former disease ulceration of the surface of the tumor is more frequently met with, and hence this lesion is more liable to be the seat of the hemorrhage than in sarcomatous growths.

PROGNOSIS.—The prognosis of carcinomatous deposits in the nasal passages is essentially grave. It becomes, however, an interesting point, as to how far the location of the disease affects the progress of the growth. In cancer, in general, we usually accept the view, that the average duration of life is three years. From a glance at the cases, however, above reported, it would seem that the nasal cavity presents a rather unfavorable location, in that, with the exception of the cases of cylindroma, the disease seems to, in many cases, run a somewhat rapid course, three years being the longest duration, while in twelve cases, in which the record is complete, the average duration of life was twelve months. Furthermore, the time of life seems to have a certain influence, as it

<sup>1</sup> Gazette des Hôpitaux, 1863, p. 521.

would appear that where the disease develops late in life, it runs a very rapid course, although this may possibly be accounted for by the fact, that, in advanced years, the vital forces are diminished, and the individual falls a more readily victim to the encroachments of the malignant process. The character of the tumor does not seem to modify the prognosis in any marked way, for while we find, in the above cases, many varieties of carcinoma, the special character seems to have had no influence. It is to be noted, however, that in Case XXII. a tumor composed of mucous glands, lined with epithelium, after a duration of three years, was cured by an operation, while in Case XXIII., a typical epithelioma was operated upon at the end of fourteen years.

Again, in Case XXIX. we find the disease eradicated at the end of a few months, in a case of what Schmiegelow reports as carcinoma cylindriformis. These cases are all undoubtedly instances of cylindroma, a form of tumor which seems to be somewhat vaguely classified by pathologists, and which, while presenting certain histological evidences of malignancy, from a clinical point of view manifests but very slight malignant tendencies, and perhaps, therefore, should not be regarded as a malignant disease. Thus, Wagner<sup>1</sup> states that probably many cases of cylindroma do not belong to cancer, while Billroth<sup>2</sup> states that this form may belong either to sarcomatous or carcinomatous tumors. Joüon,<sup>3</sup> in discussing this matter, makes the statement, that epithelioma of the mucous membrane shows a tendency to take on the tubular form, and undergo mucoid degeneration, thus giving rise to a neoplasm which is essentially benign in character, and which may run an exceedingly prolonged and slow course, without developing malignancy. Whereas, therefore, the prognosis of ordinary forms of carcinoma becomes exceedingly grave, in cylindroma, if recognized sufficiently early, and before the disease has invaded inaccessible parts, such as the sphenoid or ethmoid cells, the prognosis as to the successful arrest of the disease is to be regarded as favorable. The cause of death, in most of these cases, is exhaustion, unless death follows immediately upon an operation. The malignant process, having its origin in the nasal cavity proper, successively invades the accessory sinuses, and in still rarer cases, the cranial cavity, as is shown in Cases XIV., XVIII., XXI., and XXVII.; while in Case XVII. meningitis set in after the operation, probably as the result of pyæmia or septic infection.

TREATMENT.—If the microscopic examination shows that the

<sup>1</sup> "Manual of General Pathology," Amer. ed., N. Y., 1883, p. 489.

<sup>2</sup> "Surgical Pathology," Amer. ed., 1883, p. 746.

<sup>3</sup> Bull. Soc. Anat. de Nantes, 5th year, Séance of Feb., 1881, Paris, 1882, p. 22.



disease with which we have to deal, consists of cylindroma, treatment may be undertaken with every promise of success; but this should be borne in mind, I think in all cases, that in any treatment which is instituted, we should avoid, as far as possible, any harsh or irritating measure whereby a greater malignancy of growth might be developed. Hence, in these cases, the growth should be removed preferably by means of a cold snare, and possibly the curette, and the base cauterized, perhaps, but the caustic applied with great care, and somewhat sparingly, the action of the agent being closely observed. Schmiegelow's case would seem to clearly show the good result of this slow procedure. Where the growth has obtained considerable size, a more radical and rapid operation becomes necessary. Thus in Campbell's case, the growth was extirpated with apparent success, after excision of the superior maxillary bone. If we have to do with carcinoma, it becomes a nice question, how far life may be prolonged by the radical operation. I know of no well-authenticated case of the successful removal of a carcinoma of the nose, through the natural passages. In the majority of instances, the growth has its origin in the upper and narrower portion of the nose, in close proximity to the superior turbinated bones, hence, even when early recognized, it has invaded regions almost inaccessible by the simpler manipulations. Of course, if the growth is small, and within reach, it becomes our duty to remove it in this manner if possible. As a rule, however, a radical operation becomes unavoidable, if it is deemed justifiable to attempt any operation. The records of the cases above given, certainly offer a most discouraging outlook. In Cases V., VI., VII., and IX., the reports are too vague and incomplete to base any data upon. Aside from these, there is no radical operation reported, which seems even to offer any justification for operative interference in carcinoma of the nose. Of five radical operations done, death occurred respectively two days and two months after the operation in Cases XVII. and XIV., while in Cases II., V., and XVI., recurrence took place, followed by death, respectively in forty days, thirty days, and four months. It is a fair inference, therefore, that surgical interference, in these cases, shortened rather than prolonged life.

## CHAPTER XXXVIII.

### DISEASES OF THE ACCESSORY SINUSES OF THE NOSE.

UNDER this consideration is included a study of the diseased conditions which are met with as involving those cavities which are found in certain of the bones of the face and skull, and which communicate with the nasal passages by one or more small openings. These cavities are: The antra of Highmore, or the maxillary sinuses, the ethmoidal sinuses; the sphenoidal sinuses; and the frontal sinuses. Disease of these cavities is usually treated under the general head of Disease of the Accessory Sinuses. A better knowledge of their clinical history and significance, however, will be arrived at by their consideration under separate and distinct headings.

#### DISEASE OF THE ANTRUM.

This term is used to designate a not infrequent complication or concomitant of catarrhal inflammation of the nasal mucous membrane, which is characterized by an inflammatory process in the mucous membrane lining the antrum of Highmore, which subsequently degenerates into the purulent process, as is the almost invariable rule, where a chronic inflammation of a mucous membrane occurs in a closed cavity. This pus secretion, accumulating in the cavity of the antrum, makes its exit through the ostium maxillare, and escapes into the nasal cavity, giving rise to a more or less profuse pus discharge from the nose.

ETIOLOGY.—Zuckerkindl<sup>1</sup> takes the ground, that the most frequent cause of the disease lies in an extension of the inflammatory process from the nasal cavity, a view also entertained by Schiffers,<sup>2</sup> Chatellier,<sup>3</sup> and Krause.<sup>4</sup> In a previous chapter, this question of extension of catarrhal inflammation has been discussed somewhat at length, and the ground taken that catarrhal inflammation

<sup>1</sup> " Normale und Pathologische Anatomie der Nasenhöhle," Wien, 1882, p. 137.

<sup>2</sup> *Revue Mensuelle de Laryngologie*, Juné, 1887.

<sup>3</sup> French Soc'y of Otolaryngology, April 13th, 1887.

<sup>4</sup> Berlin. Klin. Wochenschr. 1887 No. 13, p. 228.

shows a notable hesitancy in extending from one anatomical region to another. A catarrhal inflammation of the nose is the result of local conditions, which do not, in any degree probably, operate in the maxillary sinuses. In other words, so-called nasal catarrh is a perversion of function of the normal respiratory apparatus of the nose, and its causes only operate on those tissues, and would have no effect on the delicate membrane lining the antrum. Hence, I think it is an exceedingly rare event, that disease of this cavity results by an extension of inflammation through continuity of tissue. This view, it seems to me, is notably strengthened, when we consider the large number of individuals who suffer from chronic rhinitis, and the very small proportion of these in which antral disease occurs. That hypertrophic rhinitis is the cause of the disease, in a large number of cases, is undoubtedly true, but not by extension, but rather owing to the fact that the hypertrophic process develops in such a manner as to produce stenosis or complete occlusion of the ostium maxillare. Furthermore, as we know, this orifice varies greatly in different individuals. Quite extensive hypertrophy in one case might fail to produce any notable stenosis, while in others, a moderate degree of thickening of the membrane might produce complete obstruction. The closure of this orifice would naturally act, in the first place, to produce moderate hyperæmia of the mucous membrane lining the sinus, resulting necessarily in a certain increase of secretion. Now, in health, this membrane secretes just sufficient mucus to keep its own surface moistened and no more, a fact long ago observed by Burns,<sup>1</sup> who attaches a certain amount of importance to the nice balance which must exist between the mucous secretion and the absorption by the lymphatics. Another element enters into this consideration, as pointed out by Zuckerkandl,<sup>2</sup> in that in a patulous condition of the ostium maxillare, no inconsiderable amount of moisture is dissipated by evaporation, hence, we can readily perceive, that when this orifice is closed, there would necessarily be an accumulation of secretion, even were the membrane in a healthy state. Add to this, hyperæmia, with hypersecretion in the lining membrane, and it would become apparent how the secretion must accumulate in the sinus. The necessary result of this is a catarrhal inflammation, which eventually degenerates into one characterized by a purulent discharge, for, as has already been stated, I regard it as an invariable rule that a catarrhal secretion in a closed cavity must give rise, sooner or later, to a purulent discharge.

It is a very ancient tradition, that decayed teeth are a frequent

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<sup>1</sup> "Anat. des Halses und Kopfes," aus dem Engl., Halle, 1821.

<sup>2</sup> Op. cit., p. 141.



source of purulent disease of the antrum. When we consider that the first and second molar teeth usually project into the floor of the cavity, and occasionally penetrate it (see Fig. 118) we can easily understand, as Moldenhauer<sup>1</sup> states, how caries of these teeth might act to produce suppuration in the cavity. That this is almost the only cause, as stated by Louis,<sup>2</sup> or is even the most frequent cause is doubtful, although this latter view is entertained by Fränkel,<sup>3</sup> Baratoux,<sup>4</sup> Noquet,<sup>5</sup> Boucheron,<sup>5</sup> Garel,<sup>5</sup> Gellè,<sup>5</sup> Beverley

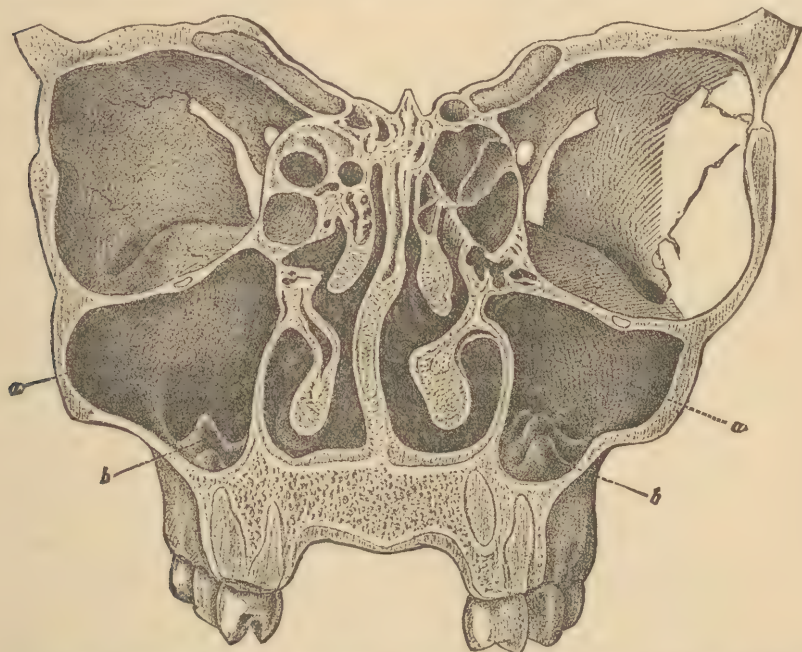


FIG. 118.—Transverse Section of the Maxillary Sinuses, showing the Roots of the Molar Teeth protruding into the cavities through the floor. (Zuckerlandl.)

Robinson,<sup>6</sup> Lennox Browne<sup>7</sup> and Garretson.<sup>8</sup> That carious teeth are a frequent source of the disease, cannot be questioned; that they are the most frequent, is probably not easy to decide. From my own point of view, I should say not, and yet we can easily understand why the last quoted writer should assert this broadly, and

<sup>1</sup> "Die Krankheiten der Nasenhöhlen," Leipzig, 1886, p. 185.

<sup>2</sup> "Obs. on Surg. Dis. of Head and Neck," Sydenham Soc. Pub., London, 1848, p. 167.

<sup>3</sup> Berliner Klinische Wochenschrift, 1887, No. 16, p. 273.

<sup>4</sup> "French Society of Otology and Laryngology," April 13th, 1887.

<sup>5</sup> Ibid.

<sup>6</sup> Trans. Amer. Laryngological Assn., 1886, p. 181.

<sup>7</sup> "The Throat and its Diseases," London, 1887, pp. 508, 528.

<sup>8</sup> "System of Oral Surgery," 1884, p. 747.

with emphasis, since cases due to carious teeth, as a rule, fall into the hands of the dentist or oral surgeon, while those cases dependent on other causes, naturally fall into the hands of the throat specialist. Watson<sup>1</sup> states that nasal polypi may produce the disease, a cause not usually mentioned by other writers, and yet I regard this as one of the most frequent sources of suppurative inflammation of the antrum. This, it seems to me, can easily be understood when we consider the fact that mucous polypi have their origin, in the large majority of cases, in the immediate region of the ostium maxillare, and very early in their development, act to produce occlusion of this orifice. I am disposed to think, that, in many cases, the involvement of the antrum is overlooked, in the somewhat more prominent symptoms to which polypi give rise, and furthermore, that its purulent discharge, becoming mingled with, and diluted, as it were, by the sero-mucous discharge excited by the polypus, fails of recognition as a distinct pus secretion. Certainly in those cases in which the polypi have developed to the extent of completely filling the nasal cavity, producing complete stenosis, I think it is almost the exception, that the maxillary sinus does not become the seat of a suppurative inflammation. This complication, however, only becomes evident after the nasal passages have been thoroughly cleared of the polypi. I am disposed to regard this, then, as perhaps the more frequent cause, hypertrophic rhinitis next, and least frequently, carious teeth. In the same manner, an attack of acute rhinitis is not infrequently attended with symptoms referable to the maxillary sinus, and hence may be an exciting cause of suppurative disease of that cavity. That this accident is not of more frequent occurrence, is probably due to the fact, that the acute rhinitis subsides in natural course, before mischief of a sufficiently permanent character has been done to the membrane lining the antrum, to lead to the development of the chronic lesion. The same may be said of croupous and diphtheritic inflammation of the nasal cavity. Furthermore, it should be mentioned that Zuckerkandl<sup>2</sup> has stated, that the mucous membrane lining the antrum does not present the anatomical characteristics which favor the development of a fibrinous exudation, and hence, an inflammation of this membrane would be of a simple catarrhal character, even in the event of its being excited by the croupous or diphtheritic lesion in the nose. A rather unique case is reported by John A. Wyeth,<sup>3</sup> in which a supernumerary tooth developing within the antrum, and acting as a foreign body, caused suppurative inflammation of the cavity. The symptoms had con-

<sup>1</sup> "Diseases of the Nose," London, 1875, p. 156.

<sup>2</sup> *Op. cit.*, p. 139.

<sup>3</sup> New York Med. Record, December 8th, 1883, p. 633.

tinued for thirteen years, and followed immediately upon an attack of scarlet fever.

Among the somewhat rare causes of the disease may be mentioned traumatism. Thus in two cases as cited by Watson<sup>1</sup> the disease was supposed to have arisen from an accident attendant on parturition, while Langenbeck<sup>2</sup> has seen two cases of suppurative disease of the antrum following Malgaigne's operation for division of the infraorbital nerve. Schech<sup>3</sup> states that it may occur as the result of an attack of facial erysipelas. I believe it to be purely a local disease, and due to local causes, although Watson<sup>4</sup> makes the broad statement that the general health is almost always at fault, and that the exciting cause would not produce suppuration, unless some general dyscrasia were present.

**PATHOLOGY.**—At the onset of the affection, the mucous membrane is hyperæmic, slightly swollen, and with its surface dotted over with minute points of ecchymosis, due to the fact that the blood-vessels coursing through the membrane, possess exceedingly thin, delicate walls which rupture easily, giving rise to slight localized hemorrhages. As the disease progresses, the membrane becomes swollen to ten or fifteen times its normal thickness, this swelling being largely due to an œdematous condition, which presents somewhat irregularly, giving rise to small, localized, rather than to diffuse, tumefactions, producing a somewhat mammillated contour. This infiltration involves not only the superficial, but the deep layer of the membrane, which in this region constitutes the periosteum of the bony walls of the sinuses. In connection with this, there is a somewhat profuse serous exudation, under which the blood-vessels unload themselves, and the swollen membrane to an extent subsides, followed by a more or less profuse secretion of sero-mucus, together with blood, and this in the course of time, occupying weeks or perhaps months, results finally in a discharge of pure, laudable pus. The later stages of the disease are characterized by a certain activity in the deep layers of the membrane or periosteum, under which there are formed lamellæ or spiculæ of new bone, which may project into the cavity, or may form thin plates, crossing it in such a way as to divide it into two or more small chambers. This perversion of function may go so far as to lead to the formation of small bony tumors within the cavity, entirely separated from its walls. This process is probably closely allied to the calcareous degeneration of the mucous membrane described by Virchow, Kölliker, and Verneuil.<sup>5</sup>

<sup>1</sup> Op. cit., p. 157.

<sup>2</sup> Arch. für Klin. Chir., Berlin, 1869, Bd. xi.

<sup>3</sup> "Diseases of the Mouth, Throat, and Nose," Eng. edition, Edinburgh, 1886, p. 278.

<sup>4</sup> Op. cit., p. 156.

<sup>5</sup> Comptes Rendus de la Soc. de Biol., Paris, 1851, p. 80.



**SYMPTOMATOLOGY.**—At the onset of the disease, if the cavity becomes filled with serum or sero-mucus, whose exit is prevented by an obstruction of the ostium maxillare, pain referable to the region becomes a prominent symptom, together with a sense of fulness and weight below the orbit. Unless relief is soon given, this pain may become of a most agonizing character, extending over the whole side of the face. The pain over the cheek bone involves the upper teeth, which give the impression of being elongated, and crowded out of their sockets, mastication thus becoming painful. In connection with the facial neuralgia, there is liable to be more or less general hyperæsthesia of the face, with tenderness on pressure over the trunks of the nerves, as they emerge from the foramina. This sense of fulness may also be felt in the roof of the mouth, which may be crowded downward from up above, and bulged into the oral cavity. Schech<sup>1</sup> states that protrusion of the eyeball, with atrophy of the optic nerve, may occur in connection with antrum disease; while Ziem<sup>2</sup> has reported a case of purulent disease of the antrum, in which the affection had caused narrowing of the field of vision, which disappeared as soon as the pus was evacuated from the maxillary sinus. These symptoms, however, would rather indicate disease of the ethmoidal or possibly the sphenoidal sinuses. These sensations may persist for several days, and are relieved spontaneously, or at the hands of the surgeon. If spontaneous relief occurs, it is usually with a profuse discharge of ill-smelling pus from the nasal cavity of the side affected, mixed with a certain amount of minute blood-clots. The escape of pus may be either through the normal opening, or by an artificial opening through the thin lateral wall of the cavity, and in still rarer cases, the spontaneous evacuation may take place through the alveolus, cheek, or orbit. Among the rarer events is the extension of the disease to neighboring cavities. Thus in the case reported by Maier<sup>3</sup> even after opening the antrum through the alveolus, the disease invaded successively the ethmoidal sinuses, the orbit and the cephalic cavities, resulting in meningitis and death.

After this spontaneous evacuation of the cavity, the pus discharge continues, for, it may be, a lengthened period of time, flowing freely from the nasal passage, when obstruction again occurs, and with its attendant symptoms of pain and sense of fulness about the maxillary region; these symptoms, however, being not so well marked, as a rule, as in the case of a primary attack, the further progress of the disease being characterized by these intermittent attacks of retention. In most cases, perhaps, the disease is

<sup>1</sup> Op. cit., p. 277.

<sup>2</sup> Berlin Klin. Wochenschr., 1888, No. 37.

<sup>3</sup> Edinburgh Med. Journal, May, 1886, p. 1,009.

chronic from the onset, the ostium maxillare remaining patulous, and the course of the disease never marked by an attack of pus retention. Where this occurs, the prominent symptom is a discharge, from one nasal cavity, of a more or less profuse purulent secretion, which shows a certain amount of diurnal intermittence. On waking in the morning, a large amount is discharged, which has accumulated over night, while through the day, the evacuations are in smaller quantities, the patient soiling perhaps three or four handkerchiefs, the pus being of a bright-yellow color, and emitting no marked odor, except, perhaps with the first discharge in the morning. In connection with this, neuralgic pains of a mild character, referable to the side of the face affected, are often noticed, which occasionally extend also to the teeth. In the late stages of this form of the disease, the teeth whose roots project into the floor of the antrum may become carious as the result of periostitis and necrosis involving the thin bony plates covering them, as shown by Zuckerkandl.<sup>1</sup>

This would suggest that the carious teeth, which in many cases are said to be the cause of the antrum disease, may rather be the effect of it. Although there may be no obstruction to the escape of the pus, the cavity is probably most of the time full, up to the level of the opening, hence in many cases, as the result of the thinning of the anterior wall, which as Moldenhauer<sup>2</sup> says may become almost parchment-like, a slight bulging, with fluctuation, may be observed over the canine fossa, although Ziem<sup>3</sup> found no facial deformity in a large number of cases under observation. As the purulent secretion passes into the nasal cavity, it retains its fluidity, and is expelled in the same condition. Crust formation is never a feature of this disease, nor is the mucous membrane of the nose in any way affected by the presence of the pus. Frontis<sup>4</sup> reports two cases, in which cough was a prominent symptom. This may have been greatly due to the diseased condition of the antrum, but more probably, I should say, to the purulent secretion making its way into the pharynx and upper air passages, as it occasionally does, especially on waking in the morning, and in that way becoming an exceedingly disagreeable and oftentimes a distressing symptom. In the same manner, I should attribute any symptoms referable to the upper air-tract to a concurrent disease of the nasal mucous membrane, rather than to the direct influence of the antral affection.

DIAGNOSIS.—A pus discharge from but one nasal cavity should

<sup>1</sup> Op. cit., p. 142.

<sup>2</sup> Op. cit., p. 186.

<sup>3</sup> As cited by Moldenhauer, op. cit., p. 187.

<sup>4</sup> North Carolina Med. Journal, January, 1887.

always excite suspicion of the existence of suppurative disease of one of the accessory sinuses. The sources of a pus discharge from the nose are, the purulent rhinitis of children, syphilis, the presence of a rhinolith or foreign body, a neoplasm, nasal diphtheria, and disease of the accessory sinuses. Now, of these affections, the only ones which give rise to a unilateral pus discharge are foreign bodies, syphilis, and neoplasms, in all of which the accompanying symptoms are so prominent, that a differential diagnosis should never be difficult. Furthermore, the character of the pus discharge in antrum disease, in all cases probably, is that of a uniformly bright yellow, cleanly secretion. The odor, furthermore, I think is somewhat characteristic, being that of sulphuretted hydrogen, and never presenting the intolerable fetor characteristic of syphilis, or the musty graveyard odor of ozæna. Furthermore, the odor is only present when pus is evacuated after being retained for a day or longer.

In making an examination of the nasal cavity, a four-per-cent solution of cocaine should first be applied, to contract the tissues, after which, on ocular inspection, there will be found a small mass of bright-yellow, canary-colored, or perhaps straw-colored pus, lying on the lower border of the middle turbinated bone, about midway of its course. If the discharge in the nose is free, the secretion will be found coating the lower turbinated body, and possibly lying upon the floor of the nares. If, however, this be wiped away with a pledget of cotton, the origin of the pus will easily be detected, as oozing from beneath the middle turbinated body. If, furthermore, a probe wrapped with a small pledget of cotton be pressed up against the point from which the pus apparently issues, the manipulation will be followed by a flow of pus, directly from the cavity, which now will emit, if the pus discharge is free, the characteristic odor of fetid hydrogen. The question of differential diagnosis now arises, to determine from which of the accessory sinuses the pus issues, and this involves some exceedingly nice questions, which are not always easily decided. Moldenhauer<sup>1</sup> makes the statement, that placing the head in different positions, will enable us to determine the source of the pus discharge, but he is somewhat indefinite as to his directions, while Schech<sup>2</sup> is equally vague on this question. Fränkel,<sup>3</sup> on the other hand, directs that after removing the pus that is visible on inspection, the head should be placed well down between the knees for some moments. If now, on a reinspection, the pus is observed beneath the middle turbinated body, the indication is that its source is the max-

<sup>1</sup> Op. cit., p. 186.

<sup>3</sup> Berlin. Klinische Woch., 1877, No. 16, p. 273.

<sup>2</sup> Op. cit., p. 277.



illary sinus, as, in this position of the head, it cannot well flow from any of the other cavities. A still better procedure is to direct the patient to lie down on the unaffected side, a position in which discharge from the antrum would be facilitated, while there would be little or no tendency to the escape of pus from any of the other sinuses, hence keeping the patient in this position for ten minutes or longer, especially if the erect position had been maintained for several hours beforehand, the exit of pus from the maxillary sinus would be obtained, if suppurative disease existed there. Percussion of the two sides should always be resorted to, as suggested by Frontis,<sup>1</sup> for by this means we may detect a dulness over the affected side, as well as a certain amount of sensitiveness. Watson<sup>2</sup> suggests tapping the teeth of the upper jaw successively, and if tenderness be discovered, that the pulp-chamber should be examined with reference to a diseased condition. Moldenhauer<sup>3</sup> states, that by means of a syringe with a properly curved nozzle, fluids may be injected, not necessarily into, but against the orifice of the antrum, when pus will be brought away. Even if this manipulation were successful, I do not think it possible to determine thereby the source of the pus discharge. Tenderness on pressure over the canine fossa, or above the alveolar process in the oral cavity, might constitute a symptom of some diagnostic value, although it is not usually present. Puncture of the antrum by means of an exploring needle, or with the aspirator, is a comparatively simple test, against which there lies no objection, other than the danger of breaking the needle, if the bone be thick or dense. This exploration should preferably be made through the outer wall of the antrum, an incision being made through the gingivo-labial fold, above the second molar tooth. Schmidt<sup>4</sup> advises that such an exploratory puncture be made in doubtful cases, by means of a strong, curved, aspirating needle, piercing the internal wall of the antrum, in the inferior meatus of the nose. If either the first or second molar tooth is carious, it should be extracted, and access to the cavity for exploratory purposes is easily obtained through the alveolar process, although I question the propriety of extracting a sound tooth for this purpose, considering the ease with which the cavity may be entered at the points above mentioned. Schech<sup>5</sup> makes the point, that in those cases where air obtains access to the cavity through a patulous ostium maxillare, a succussion sound can be obtained by the ordinary manipulation. This, I take to be somewhat theoretical, as the cavity would scarcely be large enough to produce any splashing of its purulent contents against

<sup>1</sup> Loc. cit.<sup>2</sup> Op. cit., p. 160.<sup>3</sup> Op. cit., p. 187.<sup>4</sup> Berlin. Klin. Wochenschr., 1888, No. 50.<sup>5</sup> Op. cit., p. 276.

the soft and thickened membrane which forms its walls. At best, the diagnosis of these cases is oftentimes quite obscure, and can only be obtained by exclusion, and a careful study of symptoms, the only absolute diagnostic sign being in gaining access to the cavity.

PROGNOSIS.—These cases rarely involve any danger to life, unless, as may happen, the disease extends to the sphenoidal and ethmoidal sinuses, and yet their diagnosis and treatment occasionally present difficulties, which, although not insurmountable, oftentimes tax the therapeutic resources of the surgeon, and weary the patience of the sufferers. Garretson<sup>1</sup> states with a considerable degree of emphasis that “diseases of the antrum are for the most part simple in character, easy of diagnosis, and as a rule not at all difficult of treatment.” This is the point of view of the oral surgeon, whose cases are mainly dependent on carious teeth, and which, therefore, yield readily to treatment, by the simple measure of removing the cause, when oftentimes a cure ensues without further treatment. Cases which result from intra-nasal disorders or traumatism, yield less readily, and often require a somewhat prolonged course of treatment. Spontaneous resolution of chronic suppurative disease of the antrum probably never occurs. In an acute catarrhal attack from an acute rhinitis, spontaneous resolution is perhaps the rule.

TREATMENT.—The essential feature of the treatment of a case of suppurative disease of the antrum, consists in opening the cavity for proper drainage, and subsequently its thorough cleansing and disinfection. If it occurs in connection with nasal polypi, hypertrophic rhinitis, deformity of the septum, or other obstructive lesion, I think it is important that these lesions should be removed as far as possible, by a proper mode of treatment, before further measures are resorted to. The removal of the nasal obstruction offers the hope, that the normal orifice of the cavity may be found patulous, in which case a freer drainage will be afforded. In addition to this, disinfecting lotions should be used by the patient several times daily, to prevent the ostium from becoming blocked by accumulated secretions. For this purpose there may be used a solution of carbolic acid, three grains to the ounce, boracic acid, twenty grains to the ounce, to which may be added bicarbonate or biborate of soda in the proportion of five grains to the ounce. This can be used by means of the small atomizer (see Fig. 47). After the thorough cleansing of the parts, I have seen excellent results from the use of the following, as a spray:

℞ Terebene, . . . . .	3 ss.
Ol. petrolati (Zero), . . . . .	℥ i.

<sup>1</sup> Op. cit., p. 747.

This process, however, involves a long and somewhat tedious course of treatment, with exceedingly doubtful results, for in removing the cause of the disease, it is questionable whether we succeed in even modifying the morbid process, which has fixed itself upon the mucous membrane lining the cavity, and furthermore it is not probable that fluids injected into the nasal cavity reach to any extent the diseased sinus, although Moldenhauer<sup>1</sup> thinks that projecting medicated solutions in the direction of the orifice by a properly curved syringe, is sufficient to insure their penetration. This is not sufficient, I think, for we not only require penetration of the cavity, but its thorough cleansing. Hartmann<sup>2</sup> believes ordinary politzerization to be an efficient method of opening the antral orifice, while Ziem<sup>3</sup> uses a curved nozzle, passed behind the palate, for the same procedure, in order to avoid blowing putrefactive particles into the Eustachian orifices. The practical value of these procedures I seriously question. Wolfram<sup>4</sup> reports a case of antrum disease of six months' standing, cured by the use of the steam atomizer, from which, after the parts were cleansed with the nasal douche, a two-per-cent solution of tannin and glycerine was inhaled twice daily, and subsequently acetate of alum, a cure being effected in a few weeks. Störck<sup>5</sup> treats his cases by local medication through the nose. The nozzle of a syringe is inserted directly into the antral orifice, in those cases in which this is feasible. Where this cannot be seen, he uses a syringe with a straight nozzle, the distal opening of which is closed, and a perforation made in its side. Now, by moving this along the middle meatus, he claims that when the jet enters the antrum, the patient is conscious of it, and in this way the location of the opening is ascertained, and its distance from the margin of the nostril recorded by a mark on the tube of the syringe. In order to gain freer access to the parts, he states that the nasal passages may be dilated, by packing them with pledgets of cotton, previous to the use of the syringe. I know of but one way to dilate the nasal cavity, and that is to contract the tissues by the application of cocaine, as in all forms of mechanical dilatation the stenosis recurs by the return of the blood-flow, immediately after the removal of the dilator.

In the large proportion of cases, a successful cure of disease of the maxillary sinus requires that an artificial opening be made. If the first or second molar tooth is carious, or loosened, there can be no question that the access to the cavity is better obtained by its

<sup>1</sup> *Op. cit.*, p. 187.

<sup>2</sup> As cited by Schech, *op. cit.*, p. 282.

<sup>3</sup> *Ibid.*

<sup>4</sup> *Berliner Klinische Wochenschrift*, April 21st, 1879, p. 227.

<sup>5</sup> *Wien. Med. Wochenschrift*, No. 43, 1886.



removal. In some cases, this procedure will reveal the existence of an opening, while in others, it will be necessary to drill upward through the tooth cavity, until the antrum is reached. The penetration of the sinus should be followed by an escape of pus. We thus have established two openings into the cavity, one of which being situated in its most dependent portion, presents the conditions essential for its proper drainage. The indications now are, the thorough cleansing of the diseased part, while at the same time a patulous condition of the artificial opening is maintained. Cleansing is accomplished by syringing through the artificial opening daily, until the solution escapes through the nasal orifice. The fluids adapted to this, are any of those already mentioned. After the cavity is thoroughly cleansed, there should be injected a mild and unirritating astringent, such as sulpho-carbolate of zinc, grs. v. to the ounce; resorcin, grs. v. to the ounce; hydro-naphthol, gr. ss. to the ounce, nitrate of silver, grs. v. to the ounce, etc. Astier<sup>1</sup> advises that the cavity be touched by lunar caustic fused on the end of a probe; a procedure of doubtful propriety. Tincture of iodine may



FIG. 119.—Silver Drainage Tube for the Antrum, full size.

be used in the strength of fifteen minims to the ounce of water, although Schech<sup>2</sup> has seen iodism produced by the injections of weak solutions of this agent. To prevent a closure of the artificial opening, it will be necessary to insert a drainage tube (see Fig. 119). The best form of this is a silver tube three-fourths to one inch long, and one-eighth of an inch in diameter, which should be provided with a collar or flange, as first used, I believe, by Bordenave,<sup>3</sup> by means of which it is attached, by a silk thread, to a neighboring tooth. Salter<sup>4</sup> suggests that a vulcanite plate be made to fit the gum, into which the drainage tube is inserted, of just sufficient length to reach the orifice. The lower end of the drainage tube is so constructed as to accurately fit the nozzle of the syringe, which is used for injecting into the cavity. During intervals of treatment this author suggests that a small cork should be worn in the drainage tube, to prevent the constant discharge of the offensive pus into the mouth, and also to prevent particles of food getting into

<sup>1</sup> *Revue Générale de Clinique et de Thérapeutique*, July, 1887.

<sup>2</sup> *Op. cit.*, p. 283.

<sup>3</sup> "Dis. of the Maxillary Sinus," *Mem. Royal Acad. of Surg., France*, Sydenham Soc. Pub., London, 1848, p. 145.

<sup>4</sup> Holmes's "System of Surgery," Amer. ed., Phila., 1881, vol. ii., p. 571.

the antrum. Experience has taught me that this precaution is unnecessary. In case the patient wears artificial teeth, any dental surgeon can easily attach a small piece to the plate, which pressing against the flange of the tube, will hold it in place. Any small syringe, fitted with a proper nozzle, is adapted for use in these cases. I usually direct the patient to provide himself with an ordinary dental syringe, or an Anel's lachrymal syringe (Fig. 120); with this the cavity is to be cleansed at least twice daily. In some instances patients have acquired the habit of cleansing the cavity without the use of a syringe, simply filling the mouth with a solution of salt water, or some other simple lotion, and forcing it through the tube by the lips, cheeks, and tongue, the head being held over a proper receptacle, into which the lotion falls from the nose. The retention of the tube must be continued according to

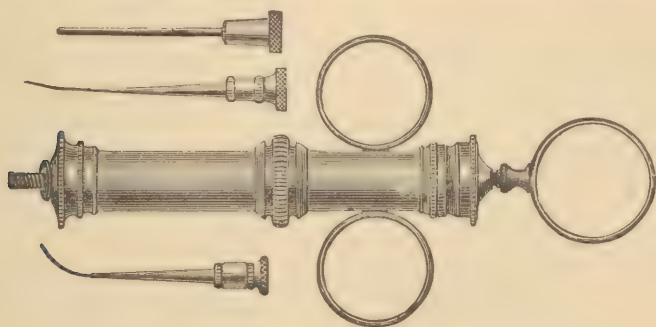


FIG. 120.—Anel's Lachrymal Syringe, for use in Disease of the Antrum.

the duration of the pus discharge. In one of Bordenave's<sup>1</sup> cases, a cure was effected and the tube removed at the end of two months, while in another<sup>2</sup> it was retained for two years, before it could be removed with safety.

When the cavity is first opened, it is important that it should be thoroughly explored by means of the probe, in order to detect the existence of necrosed bone, or other unusual conditions, as thus, in Wyeth's case, already alluded to, a supernumerary tooth was the source of the suppuration, while in a case cited by Giraldes<sup>3</sup> local medication failed to arrest the suppurative process, until the existence of a bony septum traversing the cavity was discovered, and broken up by means of a probe. In those cases in which no evidence of diseased teeth is discovered, the question arises as to the propriety of sacrificing a sound tooth. The only advantage of

<sup>1</sup> Loc. cit., p. 146.

<sup>2</sup> Loc. cit., p. 147.

<sup>3</sup> "Des Maladies du Sinus Maxillaire," Paris, 1851.

this lies in the fact, that we thereby establish an artificial opening in the most favorable position for securing drainage, viz.: in the dependent portion of the cavity. I do not think the advantage of this opening is sufficient to warrant the sacrifice of a sound tooth, when we consider the simplicity and efficacy of the operation first suggested by Mickulicz,<sup>1</sup> of opening into the antrum through the inferior meatus. This is done by an instrument, which consists of a spear-pointed knife, mounted on a shaft, curved to a right angle, and fitted with a shoulder, about three-eighths of an inch from the point, in such a manner as to regulate the depth of the cut. The instrument being carried within the nostril, the incision is made at a point in the lower meatus, immediately below the normal orifice of the antrum, the direction of the incision being upward, backward, and outward, in order to avoid the hard, bony tissue at the lower border of the septum, which could not be easily penetrated. A diamond-shaped opening is thus established, which is sufficiently near to the floor of the antrum to afford ample drainage facilities, and is also easily accessible for subsequent cleansing and medicating procedures, which are essentially the same as those mentioned in connection with the alveolar opening. The hemorrhage attending the operation is but trivial, and can easily be controlled. Mickulicz states, that the operation is impracticable if the entrance is very narrow, or the bones very hard, or where there is extreme hypertrophy of the lower turbinated bone. It need scarcely be stated that the operation should be done with the use of cocaine, which in every case, I think, would so far eliminate the turbinated hypertrophy, by contracting the tissues, as to overcome any obstacle that that condition might present. If deflection of the septum hamper the manipulation, it can easily be removed by means of the saw. If the bone is found to be sufficiently hard to resist penetration by the knife, a burr or drill, or perhaps Curtis's trephine, can be manipulated by the dental engine or electro-motor. An artificial opening to the antrum through the nasal cavity is by no means new, for in the last century, we find Hunter<sup>2</sup> recommending this operation, but advising, however, that it should be done in the middle meatus; on what grounds it is not easy to determine, unless the idea was to re-establish the normal orifice. The very serious objection lies against it, however, that it does not establish drainage, and moreover the normal orifice is quite patulous in many cases of suppurative disease of the antrum, and yet the suppurative process persists. I see, therefore, but little ad-

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<sup>1</sup> *Zeitschrift für Heilkunde*, 1886, p. 257.

<sup>2</sup> "Practical Treatise on Diseases of the Teeth," London, 1771.



vantage to be gained from the operation, although it is indorsed by Jourdain,<sup>1</sup> Schiffrs,<sup>2</sup> and Zuckerkandl.<sup>3</sup> Mickulicz's operation does not open the antrum at its lowest portion, yet it is sufficient practically to afford ample drainage of the sinus, and I fully agree with Fränkel<sup>4</sup> in the view, that the antrum should be opened in the lower meatus, in preference to any other locality, unless a carious molar tooth invites the alveolar opening. There may be conditions rendering it necessary to make the opening through the canine fossa, such as ankylosis of the jaw, preventing the removal of a tooth, in connection with insuperable objections to Mickulicz's operation. An opening in this region offers no special advantages, while the wearing of a drainage tube in this locality might prove a source of considerable annoyance, and furthermore, it is usually a matter of some difficulty to keep the opening patulous. La Morier<sup>5</sup> as early as 1740 resorted to this operation in a case in which there was a somewhat extensive necrosis of the alveolar process, and which had existed for several years. He made the opening sufficiently large to admit the little finger into the cavity, by means of which its walls were subjected to digital exploration. In this case the opening remained patulous, giving rise to a defect in articulation similar to that of cleft palate, which was only remedied by wearing artificial plugs. The suppurative disease was cured, however, in a few weeks. In those cases in which, as the result of the long retention of pus, the anterior wall of the antrum has become thin, and the pus shows a tendency to point upon the cheek, this disposition should be corrected as soon as possible, by an artificial opening elsewhere, since it is probably never wise to open the antrum through the cheek, as, in that case, a permanent fistulous opening is liable to form.

#### DISEASE OF THE ETHMOIDAL SINUSES.

In these sinuses, we meet with catarrhal inflammation, and also the suppurative process. In the former instance, it is probably, in most cases, a complication of an attack of acute rhinitis, and hence its symptoms are, to an extent, masked by those of the inflammatory process in the nasal cavities. The only feature of the attack, which should direct prominent attention to the ethmoidal sinus, is simply pain, referable to that region, of an intensity and per-

<sup>1</sup> Hyrtl, "Topographische Anat.," Wien, 1871.

<sup>2</sup> *Revue de Laryngologie*, June, 1887.

<sup>3</sup> *Op. cit.*, p. 143.

<sup>4</sup> *Berliner Klinische Wochenschrift*, No. 16, 1887, p. 273.

<sup>5</sup> *Mem. Acad. Fr.*, 1743.

sistence not usually characteristic of an ordinary cold in the head. It usually subsides spontaneously, as the inflammatory process in the nose undergoes resolution. Suppurative disease of the ethmoidal sinuses, on the other hand, is an affection of far more serious import, involving as it does, symptoms of a more troublesome and even dangerous character, in that its tendency is toward caries and necrosis of the bony structures underlying the mucous membrane.

ETIOLOGY.—It may develop from a simple catarrhal process, complicating an acute rhinitis, as in the following case reported by Schäffer:<sup>1</sup>

A soldier, 23 years old, after the ordinary symptoms of a cold in the head, commenced to suffer from a swelling of the eyelids on the right side, together with right exophthalmos; at the same time there set in an ill-smelling, mucopurulent discharge from the right nasal cavity; an orbital abscess finally developed, from which pus was evacuated by incisions. By injections through these incisions, the fluid flowed freely from the right nasal cavity. Death finally occurred from meningitis, and the post-mortem examination revealed a suppurative patch of the size of a walnut in the ethmoidal cells, with ulceration of the osseous tissue.

The disease may also develop in connection with a chronic rhinitis, the hypertrophic process gradually extending toward, and occluding the ostium ethmoidale, in much the same way as has been noticed in connection with disease of the antrum. This apparently was the primary origin of the attack in Hartmann's<sup>2</sup> case, as follows:

A man, aged 26, was seized with a violent pain over the frontal region, which increased in severity, and gradually extended over the whole of the left side of the face, while at the same time protrusion of the left eyeball became noticeable, and slowly increased. At the end of two weeks, marked febrile movement set in. Soon after the exophthalmos became apparent, a more or less profuse purulent discharge made its appearance from the nasal cavity, which the patient himself noticed was increased by pressure upon the eyeball. Three weeks after the onset of the attack, he was admitted to the hospital, presenting, in addition to the foregoing symptoms, immobility of the left eyeball in all directions, with diplopia. The ophthalmoscopic appearances, and pupillary reaction, were normal, the field of vision being free. Under the use of disinfecting lotions and palliative measures, the case progressed favorably, and two months after the onset of the attack, a bony sequestrum was removed, and the patient was discharged cured two weeks later.

In rare instances, the disease may develop from traumatic causes, as from a blow upon the nose, giving rise to a fracture of the vomer, or a sutural dislocation in the neighborhood of the ethmoid

<sup>1</sup> Prag. Med. Wochenschrift, 1883, No. 20.

<sup>2</sup> Quoted by Berger and Tyrman, "Die Krankheiten der Keilbein-Höhle und des Siebbein-Labyrinthes," Wiesbaden, 1886, p. 14.

plate, the inflammatory process attending the accident causing occlusion of the ostium ethmoidale, or possibly the disease may arise from an extension of the morbid lesion. In still rarer instances, the os planum itself, or the labyrinthine walls, may be fractured as the result of external injury. The ulcerative processes accompanying syphilis, tuberculosis, and possibly scrofula, may undoubtedly give rise to a suppurative disease of the ethmoid cells, as stated by Berger and Tyrman,<sup>1</sup> yet such cases do not constitute properly an attack of suppurative disease of the ethmoid sinuses, being simply an adventitious complication, the symptoms of which are entirely overshadowed by the graver disease, which has given rise to them.

The well-known action of phosphorus on the bones of the face, would naturally suggest this as one of the causes of disease of the ethmoid cells. I am not aware that the ethmoid cells have ever been primarily attacked from this cause, although Scobell Savory<sup>2</sup> has reported the case of a young man who worked in phosphorus, and who died as the result of disease contracted therefrom, in whom the *post-mortem* revealed the ethmoid bone almost completely destroyed by the necrotic process, which also involved the sphenoid, and most of the facial bones.

The development of nasal polypi, with its accompanying nasal obstruction, may give rise to ethmoid disease, in much the same manner as that described in connection with disease of the antrum, although the latter cavity is far more liable, I think, to be the site of suppurative disease from this cause. Woakes<sup>3</sup> endeavors to trace a very close connection between mucous polypi in the nose, and what he terms necrosing ethmoiditis, going so far as to state<sup>4</sup> that "the two pathological conditions run on side by side, experience confirming, that when polypus exists necrosis is also present, but the converse position cannot be maintained, necrosis being demonstrable earlier, and occurring much more frequently, than does myxoma." This remarkable statement I cannot indorse, as I regard ethmoid disease as one of the rarest complications of nasal polypi.

Berger and Tyrman<sup>5</sup> mention facial erysipelas as a possible cause of the disease. There seems to be some question, however, whether in these cases the erysipelas be due to an acute rhinitis, or the acute rhinitis the result of erysipelas. Weichselbaum,<sup>6</sup> after a

<sup>1</sup> Op. cit., pp. 13 and 27.      <sup>2</sup> Med. Chirurgical Trans., 1874, vol. lvii., p. 187.

<sup>3</sup> "Nasal Polypus," Amer. ed., Phila., 1887.

<sup>4</sup> Op. cit., p. 13.

<sup>5</sup> Op. cit., p. 13.

<sup>6</sup> "Phlegmonöse Entzündung der Nebenhöhlen der Nase." Wr. Med. Jahrb., 1881,



somewhat careful analysis of ten such cases, finds himself still in doubt as to this point. In either case the ethmoid disease develops as the result of the nasal inflammation.

We thus find, in the large majority of instances, the disease develops from causes in the nasal cavity. Occasionally, however, we find it occurring as the result of disease in the orbital cavity, as in the case reported by Vossius<sup>1</sup> in which the extraction of a molar tooth gave rise to a thrombosis of the accessory orbital veins, and the subsequent development of an abscess in the orbital cavity, which penetrated the os planum, and set up suppurative disease of the ethmoid.

**PATHOLOGY.**—The morbid process here develops in essentially the same manner as that already described in connection with disease of the antrum. The hyperæmia results in a sero-mucous exudation, which, owing to the fact that the cavity is closed, soon degenerates into a suppurative inflammation. The accumulation of pus soon follows, and distends the cells, while at the same time the inflammatory process in the mucous membrane, extending to its deep layers, which constitute the periosteum of the thin, bony walls, results in the development of a true periostitis. The necessary consequence of this is the early occurrence of necrosis and exfoliation of bone. We see, therefore, that the tendency in all cases, and the result in the large majority of instances, of a suppurative inflammation of the ethmoid cells, is necrosis of bone, hence Woakes's newly invented term of necrosing ethmoiditis, would seem to be scarcely called for, since all ethmoiditis tends toward, and usually develops sooner or later into, necrosis.

**SYMPTOMATOLOGY.**—The earliest symptom of ethmoid disease is pain referable to the lower frontal region, and generally confined to one side. As the disease progresses, the pain increases in severity, and may extend to the whole side of the face, but being most intense as a deep-seated orbital or frontal pain. The discharge of pus from the nasal cavity of the side affected, sets in early in the attack, and has a bright yellow color and laudable appearance. The pus discharge at first may be attended with the characteristic fetid hydrogen odor. If the flow becomes established, however, this disappears to a great extent, returning in the course of one or two months, with the development of necrosis, when it assumes the characteristic fetor of dead bone. Its character, also, is now changed, in that it may contain shreds of necrotic tissue, or the débris from the process of bony destruction. With the distention of the cells from pus, a giving-way occurs on the side of least

<sup>1</sup> "Ein Fall von Orbitalphlegmone bei Thrombophlebitis der Orbitalvenen, etc.," v. Gräfe's Archiv, vol. xxx.

resistance, which is toward the orbit, hence, a bulging of the eye of that side may occur very early in the disease, accompanied with functional symptoms attendant upon ocular dislocation, such as immobility of the eye, and impairment of vision with diplopia. Allusion has already been made to the fact, that in a certain number of cases, the direct connection between the exophthalmos and the pus discharge can be demonstrated, from the fact that pressure upon the eyeball causes a flow of pus into the nasal cavity. Febrile movement occurs early in the course of the disease, and shows the usual remittent type characteristic of pus formation, showing a daily variation of from one to two degrees, the evening exacerbation of fever rarely developing a temperature above  $102^{\circ}$ , while the morning temperature will not vary greatly from  $100^{\circ}$ . Chills or chilly sensations do not occur, except in connection with an unusual access of febrile movement. A pus discharge, although almost an invariable rule, is not always present, as in a case reported by Vernujne,<sup>1</sup> a girl sixteen years of age, suffering from naso-pharyngeal catarrh since she was five years of age, probably the result of scarlet fever, was attacked with the ordinary symptoms of ethmoid disease, with the exception of the purulent discharge. Vernujne made a diagnosis of retention cyst in the ethmoid cells, basing this conclusion on a somewhat similar case observed by Knapp,<sup>2</sup> in which a pus sac formed in the ethmoid, and crowding the os planum before it, presented at the inner canthus of the eye, apparently as an osteoma, which, however, upon being opened with a chisel was found to contain pus.

DIAGNOSIS.—An examination of the nasal cavity will reveal a discharge of bright-yellow healthy pus, making its way from beneath the middle turbinated body of the side affected, which always indicates the existence of suppurative disease of one of the accessory sinuses. The question to determine now is, which of these cavities is the source of the discharge. Ingals<sup>3</sup> makes the point, that in antrum disease, the pus flows down over the middle of the lower turbinated body, while in ethmoid disease, it is found on its posterior termination. This condition is not greatly to be depended upon, as whatever be the source of the discharge, if it is large in amount, it diffuses itself pretty generally over the whole of the lower turbinated body, and moreover, the direction of the flow would be determined somewhat by the position of the body. Nor is much information afforded by Fränkel's suggestion, already al-

<sup>1</sup> Amer. Journal of Ophthalmology, 1884, vol. i., No. 5, p. 129.

<sup>2</sup> Fifth Ophthalmological Congress, N. Y., 1876, p. 55.

<sup>3</sup> "Suppurative Inflammation of the Antrum," Journal Amer. Med. Association, July 30th, 1887.

luded to in the chapter on disease of the antrum, that by lowering the head, the flow is promoted from the antrum, while the erect position facilitates the discharge from the other sinuses. Our diagnosis, then, must be made on the co-existence of a pus discharge from beneath the middle turbinated body, in connection with deep-seated pain and exophthalmos, the latter symptom being the one which points most directly toward disease of the ethmoidal labyrinth. Berger and Tyrman<sup>1</sup> mention emphysema of the orbit as occasionally present in these cases, its existence being due to necrosis of the os planum. This condition can be recognized by the peculiar cracking sound produced by pressure on the eyeball. It would only exist, however, in connection with exophthalmos.

PROGNOSIS.—The simple catarrhal disease of the ethmoid sinuses, which usually occurs in connection with an attack of acute rhinitis, undergoes resolution in the large majority of instances without treatment. Suppurative disease, on the other hand, runs a decidedly chronic course, and shows little tendency to spontaneous resolution. While the disease confines itself to the ethmoid sinuses, it involves no serious danger to life, but in those rarer cases in which the diseased action extends to the cranial cavity, the prognosis becomes exceedingly grave, and almost necessarily fatal. Probably in the majority of instances, where the disease extends to a neighboring cavity, the orbit is the part invaded. So marked is this, that the existence of an orbital abscess should in all cases suggest the existence of ethmoidal disease as its source, as in a case reported by Sonnenberg<sup>2</sup> the pus discharge from the nose was not present, until after incision of the abscess in the orbit. Owing to their close and intimate anatomical relation, invasion of the sphenoidal sinuses is a not infrequent complication of ethmoidal disease, although not one which can be recognized by any diagnostic signs. The suppurative disease confined to the ethmoid cavities, runs a somewhat slow course, and eventually leads to necrosis, which first involves the labyrinthine plates, which may undergo spontaneous expulsion, as in Hartmann's case already cited, or may extend to the os planum, and the cribriform plate, and thus involve the neighboring cavities. In either instance, the labyrinthine walls become subject to the process of caries, under which the destruction goes on very slowly, and the disease runs a course, which may be prolonged into months or even years.

TREATMENT.—The indications for the treatment of ethmoid disease are naturally the same as those in disease of the antrum.

<sup>1</sup> Op. cit., p. 28.

<sup>2</sup> "Beitrag zur acuten Zellgewebs-Entzündungen der Augenhöhle," Deutsche Zeitschrift für Chirurgie, 1877, vol. vii., p. 500.



They consist essentially in thoroughly cleansing and disinfecting the nasal cavity, and subsequently in establishing proper drainage from the diseased sinuses. In most instances, probably, it will be necessary to resort to surgical interference, although occasionally it may be possible by simple measures, such as disinfecting sprays and douches in the nose, and the subsequent use of cocaine to contract the tissue, to so far open the nasal passages, and gain access to the normal orifice, as to facilitate the pus discharge, and establish free drainage. Thus, in Hartmann's case, already alluded to, this was the only measure of treatment applied. Unfortunately, such good fortune cannot always be anticipated, and hence more active measures are demanded in the majority of cases. These consist in establishing an artificial opening into the sinus. This opening must necessarily be made above the middle turbinated body, and hence is an exceedingly delicate and difficult manipulation. Ziem, who was the first to open these sinuses, advises that this should be done, after removing a portion of the middle turbinated bone, thus gaining a freer access to the superior meatus, where the posterior ethmoidal cells are to be opened by means of a probe or injection needle carried obliquely along the junction of the bony and cartilaginous septum, upward and backward, and directly into the cells. Schech,<sup>1</sup> recognizing the difficulty of gaining access to this region through the nostril, suggests that a freer manipulation, and a better view may be obtained, by splitting open the external nose. Ziem seems not to have been especially successful in his operation, and hence it seems to me, that if it becomes advisable to open the ethmoid cells, it should only be attempted after the external operation as suggested by Schech, although for this purpose, it would be wiser to tilt the nose to one side by means of Boeckel's operation, or to drop it downward, after Ollier's method, after which, the cavity being brought thoroughly and widely into view, the cells may be opened by means of a probe or drill, and necrosed bone, if it be present, removed by the curette or gouge. It is only candid to state, however, in regard to this operation, that the literature of ethmoidal disease contains no cases which were treated with notable success in this manner. In most instances, the treatment has consisted in the persistent use of cleansing and disinfecting lotions, and the use of politizerization, after the manner of Hartmann or Ziem. Whenever complicating lesions manifest themselves, their treatment is to be directed by general surgical rules. If orbital abscess occur, it is to be opened at the earliest moment, and efficient drainage established.

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<sup>1</sup> Op. cit., p. 284.

## DISEASE OF THE SPHENOIDAL SINUSES.

Simple catarrhal inflammation of the mucous membrane lining the sinuses of the sphenoid bone, occurs probably not infrequently as a complication of an acute rhinitis, as is the case with the other accessory sinuses. This, however, is not evidenced by any very marked symptoms, and may undergo resolution, with the subsidence of the nasal disorder. Suppurative disease in this region, however, constitutes an affection of very serious import, in that, as in the other sinuses, it manifests but little disposition to undergo a spontaneous cure, but on the contrary gradually extends to the deep layers of the membrane and the periosteum, resulting in a bony necrosis.

ETIOLOGY.—The course and development of the morbid process here is much the same as we find it in the other accessory sinuses, and probably arises primarily from obstruction of the ostium sphenoidale, resulting in a retention of secretion, with consequent suppurative inflammation. This obstruction may result from the encoachment of hypertrophic inflammation of the mucous membrane lining the nasal cavities, the existence of polypi or other tumors, the presence of foreign bodies, or some deformity of the nasal cavity, which acts to occlude the normal orifice. Zuckerkandl<sup>1</sup> raises the question, whether in some certain cases the necrosis may not be primary, and the pus discharge a resultant symptom, although favoring the view that in the majority of instances the necrosis is the result of a morbid process in the mucous membrane. Schech<sup>2</sup> states that purulent accumulations in these sinuses have been observed in connection with cerebro-spinal meningitis, this complication resulting probably from contiguity of structure, or this may possibly serve to substantiate the recent view entertained in regard to spotted fever, that it is the result of a germ, taken into the system by inhalation through the nasal passages. Berger and Tyrman<sup>3</sup> enumerate among the causes of the disease, syphilis and scrofula, giving the former as its more frequent cause, although I am disposed to regard intra-nasal disorder, as already stated, as more liable to produce the disease. Zuccarini,<sup>4</sup> in an investigation of the relation of facial erysipelas to typhus fever, has found sphenoidal disease in a post-mortem on one patient, in whom

<sup>1</sup> "Anatomie der Nasenhöhle," Wien, 1882, p. 174.

<sup>2</sup> "Diseases of the Mouth, Throat, and Nose," Eng. ed., Edinburgh, 1886, p. 280.

<sup>3</sup> "Die Krankheiten der Keilbein-Höhle und des Siebbein-Labyrinthes," etc., p. 22.

<sup>4</sup> "Gesichtsrothlauf in Verlaufe des Typhus," Wien. Med. Wochenschr., 1853.

these two affections co-existed. A similar case has come under the observation of Weichselbaum.<sup>1</sup>

**PATHOLOGY.**—The pathological changes which take place in the mucous membrane of these sinuses, consist essentially in a catarrhal inflammation, gradually extending to the deeper tissues, which here constitute the periosteum, as the result of which, the nutrition of bone is so far interfered with, that necrosis occurs in precisely a similar manner to that already described in the discussion of ethmoidal disease, the simple catarrhal inflammation being converted into a suppurative process, as the result of obstruction to the orifice, and resultant accumulation of the secretions. Hence, we can easily see how, as noted by Ziem,<sup>2</sup> the anatomical situation of the orifices of the sphenoidal sinuses and the antrum, favor the development of suppurative inflammation, being situated on the lateral wall of the sinus, thus differing from the ethmoidal and frontal sinuses, whose orifices admit of freer drainage, while Zuckerkandl<sup>3</sup> singles out the ostium sphenoidale, as being located in a manner particularly unfavorable to the free escape of accumulated secretions.

**SYMPTOMATOLOGY.**—More or less profuse purulent discharge from the nasal cavity is a prominent symptom of the disease, this pus being the same bright-yellow healthy pus which is characteristic of suppurative disease of all of the accessory sinuses. The discharge makes its way backward, as a rule, dropping into the pharynx. Lennox Browne<sup>4</sup> makes the statement that "sphenoidal discharges may be the forerunner, and possibly the excitant, of obstinate post-nasal catarrh." This is scarcely a correct observation. Certainly the discharge excites no morbid condition in the mucous membrane over which it passes, and moreover, a pus secretion does not occur in what is ordinarily termed a post-nasal catarrh. Deep-seated pain is always present, referable to the side affected, and in some cases may be of a most distressing character, radiating through the whole side of the face, involving all the branches of the trigeminus, as in a case observed by Rouge,<sup>5</sup> the dental branches of the superior maxillary nerve became the seat of a neuralgia of so intense a nature, as to lead Rouge to make a diagnosis of disease of the antrum, for which he performed resection, the death of the patient occurring soon afterward. An autopsy revealed an accumulation of cheesy pus in the sphenoidal sinuses, while the maxillary sinus was

<sup>1</sup> Wien. Med. Jahrbuch, 1881.

<sup>2</sup> Monatsschr. für Ohrenheilkunde, 1886, No. 3, p. 82.

<sup>3</sup> Op. cit., p. 173.

<sup>4</sup> "The Throat and its Diseases," London, 1887, p. 529.

<sup>5</sup> Cited by Berger and Tyrman, op. cit., p. 23.



perfectly healthy. Owing to the proximity of the sphenoidal sinuses to the optic foramina, ocular symptoms might naturally be expected, and hence impairment of vision or complete blindness may occur, as the result of pressure on the optic nerve; as, in the case reported by Horner<sup>1</sup> of a girl fifteen years of age, who, after having complained of headache for some time, suddenly became blind in the right eye; at the same time there was exophthalmos and immobility of the eyeball; the ophthalmoscopic examination showed slight swelling of the optic nerve; there was no swelling of the eyelids. Two months after the blindness came on, the patient died of meningitis. The autopsy showed necrosis of the sphenoidal sinuses. The changes were most marked about the right optic foramen. The cellular tissue of the orbit was infiltrated with serum. A similar case reported by Post<sup>2</sup> presents the additional point of interest, in the ultimate recovery of the patient, who in the course of the disease developed both exophthalmos and amaurosis, dependent upon necrosis of the lesser wing of the sphenoid. Extraction of the sequestrum was followed by a return of the eye to its normal position, but the amaurosis was not relieved. The exophthalmos in this case may have been due to serous exudation, caused by obstruction to the return circulation, by pressure on the orbital veins in their passage through the sphenoidal fissure as in Horner's case, or the diseased process of the body of the sphenoid may have extended to the great wings, where they form a portion of the outer and superior wall of the orbit, thus leading to the development of an orbital abscess, and resultant protrusion of the eye as in the case reported by Panas<sup>3</sup> where, as the result of an ostitis of the sphenoid, sudden blindness set in, followed by the development of an abscess in the orbit. The notable symptoms then, we find, are a pus discharge with pain, followed, as the disease progresses, by a somewhat sudden occurrence of blindness, and in a certain proportion of cases the development of orbital abscess, or serous exudation into the cellular tissue of the orbit.

Berger<sup>4</sup> calls attention to a peculiar feature of the amaurosis occurring in connection with cases of sphenoidal disease, in that the peripheral field of vision is invaded before the central field is affected. This is explained by the fact, as first observed by Samelsohn, that the central fibres of the optic nerve are distributed to the macula lutea, while the peripheral fibres are distributed to the outer portion of the retina.

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<sup>1</sup> *Klin. Monatsbl. f. Augenh.*, Febr., 1863.

<sup>2</sup> *London Lancet*, May 6th, 1882, p. 734.

<sup>3</sup> *Gaz. des Hôpitaux*, 1873, p. 1148.

<sup>4</sup> *Revue Mensuelle de Laryngologie*, July, 1888, p. 400.

DIAGNOSIS.—A diagnosis of suppurative disease of one of the accessory sinuses having been established by the existence of a discharge of bright-yellow healthy pus from one of the nasal passages, the attention would necessarily be directed toward the sphenoidal sinus as the seat of the disease, by the fact of the pus pouring over the surface of the middle turbinated bone, and that its source can be traced to the superior meatus, provided the nasal passages are sufficiently patulous to admit of a thorough exploration. It should be stated, however, that this nice localization of a purulent discharge in this region is very rarely possible by an examination anteriorly, although it may occasionally be accomplished by posterior rhinoscopy. In those cases of ethmoidal disease in which the posterior group of cells is involved, we may also have a pus discharge into the superior meatus. In these cases, the recognition of the disease will necessarily be based on a consideration of concomitant symptoms, although it should be stated, that probably, in the majority of cases in which the posterior group of ethmoidal cells is the seat of the disease, the sphenoidal sinuses are involved in the same morbid process, owing to their close anatomical relation, and the fact that the orifices both of the sphenoidal and posterior ethmoidal cells open together into the superior meatus, and hence the same causes which would operate to produce suppurative disease in one group, would act equally on the other. The pus discharge makes its way into the pharynx, giving rise to symptoms of ordinary so-called naso-pharyngeal catarrh, although the character of the secretion differs essentially from the ordinary inspissated mucus which is found in the pharyngeal vault in that disease. Suppurative inflammation of the pharyngeal bursa, the so-called Tornwaldt's disease, gives rise to a pus discharge into the pharyngeal vault. This affection, however, I regard as an exceedingly rare one, and furthermore, a rhinoscopic examination should easily establish the source of the purulent secretion. Ziem<sup>1</sup> has reported a rather interesting case, in which a somewhat profuse purulent discharge into both the pharyngeal vault and the nasal cavities, had its origin in a cyst of the pharyngeal bursa, the removal of which seemed for a while to arrest the disease, although subsequently it became necessary to open the antrum, on account of suppurative inflammation of that cavity. Further diagnostic signs pointing to sphenoidal disease, consist of deep-seated pain, exophthalmos, paralysis of the optic nerve, or paresis of any of the motor nerves passing through the sphenoidal fissure. The deep-seated pain is characteristic both of sphenoidal and ethmoidal disease, and presents no points especially indicative of either affection. Exophthalmos is present in a

<sup>1</sup> Monatsschr. f. Ohrenheilkunde, 1886, Nos. 2, 3, and 4.

large proportion of cases, but is probably not so constant a symptom of this affection, as of ethmoidal disease. One of the earliest effects of distention of the sphenoidal sinus by pus, would be pressure on the optic nerve, in its passage through the optic foramen, hence the sudden onset of amaurosis occurs in probably a large proportion of cases. An examination by the ophthalmoscope in these cases should reveal the characteristic swollen disc. Still further diagnostic indications are furnished by the results of pressure on the nerves passing through the sphenoidal fissure, causing ptosis, strabismus, or immobility of the eyeball.

COURSE AND PROGNOSIS.—The prognosis of these cases, as a rule, is grave, as owing to the depth and inaccessibility of the parts affected, and the difficulty of reaching them with proper remedial measures, suppurative inflammation sooner or later leads to a necrosis of bone, which extending slowly, invades the orbital cavity, producing paralysis of the optic nerve. Death may occur as the result of meningitis as in Horner's case, or as the result of invasion of the cavernous sinus by an erosion of its wall, as in the case reported by Scholz<sup>1</sup> whose patient, twenty-one years old, suffered from delirium tremens, developing facial phlegmon, subsequently going on to abscess of the cheek. After several days, there was a discharge of pus into the mouth, behind the last upper molar tooth. The patient suffered from frequent rigors. Ten days after the beginning of the illness, there were spasmodic contractions of the extremities, with coma; about twenty-four hours after, left-sided ptosis; on the evening of the same day, there was profuse hemorrhage from the mouth and nose, of which the patient died. The autopsy showed the cause of death to be an erosion of the cavernous sinus, and a destruction of the bony substance of the body of the sphenoid on the right side, thus establishing direct communication between the sphenoidal cells and the cavernous sinus. In this case, the primary seat of the disease was in the sphenoidal cells. Blachey<sup>2</sup> and Lloyd, as cited by Berger and Tyrman,<sup>3</sup> report cases of thrombosis of the circular and cavernous sinus and of the ophthalmic veins. A somewhat unique case is reported by Baratoux,<sup>4</sup> in which nature effected a cure by the spontaneous expulsion of the whole body of the sphenoid through the nose, the singular feature of the case being, that during the course of the disease, there were no symptoms of meningeal irritation or impairment of vision.

TREATMENT.—The same palliative measures are indicated here,

<sup>1</sup> Berlin. Klin. Wochenschr., 1872, No. 43, p. 516.

<sup>2</sup> Gaz. Hebdl., 1863, x., p. 44.

<sup>3</sup> Op. cit., p. 26.

<sup>4</sup> Progrès Médical, 1883, p. 826.



as noted in the directions for treatment of ethmoidal and antral disease. These consist in the use of cleansing and disinfecting sprays and washes, together with politzerization, either anteriorly, or posteriorly according to Ziem's method. These should be used frequently and with every thoroughness, in order to secure as efficient drainage of the diseased cavity as is possible in this manner. The indications for the radical treatment of the disease consist simply in opening the cavity for the discharge of pus in its early stages, and the removal of necrosed bone where feasible, in its later development. Zuckerkandl<sup>1</sup> advises the opening of the sphenoidal sinus through the nasal cavity, at its anterior and dependent portion, whereby the most efficient drainage may be secured. He directs that the trocar shall be introduced along the septum, passing upward and backward, across the middle turbinated bone, about at the junction of its posterior and middle third, until it reaches the anterior wall of the sphenoid cells, when it is pushed directly into the cavity. Zuckerkandl's advice is based entirely on anatomical study of the cadaver. The first to perform Zuckerkandl's operation on the living subject was Schäffer<sup>2</sup> who succeeded in opening the sphenoidal cells, making use of a spoon-shaped instrument instead of the trocar, by means of which he also removed small fragments of necrosed bone. It is scarcely necessary to state that this operation demands not only a high degree of manipulative dexterity, but also exceeding great care, as it is not unattended with a certain amount of risk of entering the cranial cavity. Indeed so great is this danger that Schech<sup>3</sup> regards the operation as unadvisable, preferring to approach the cavity through the vault of the pharynx, making his opening through the lower plate of the body of the sphenoid, just behind the border of the posterior nares. In this connection, Schech refers to a case reported by Stoerk, which seems to favor this point of operation, where a spontaneous opening at this point occurred in the case of a scrofulous boy, suffering from sphenoidal disease. Bronner,<sup>4</sup> however, reports a successful case in which the sphenoidal cells were scraped out by means of a sharp spoon, necrosis having been detected by means of the probe. The entire procedure was accomplished by manipulation through the nasal cavity. The case is a notable one, if we accept the correctness of Bronner's diagnosis, and yet I think this is open to very serious question, in that it would be almost impossible in most cases to absolutely localize the sphenoidal sinuses, by a probe intro-

<sup>1</sup> Op. cit., p. 174.

<sup>2</sup> "Chirurgische Erfahrungen in der Rhinologie und Laryngologie;" Wiesbaden, 1885, p. 4.

<sup>3</sup> Op. cit., p. 234.

<sup>4</sup> Medical Press and Circular, April 4th, 1888, p. 343.

duced through the nostrils, or to intelligently manipulate a curette in this manner. After an opening has been established, the further treatment of the disease consists in daily washing out the cavity, by means of cleansing and disinfecting lotions, while at the same time the patency of the orifice is maintained by proper means. If bony necrosis is found to exist, it should be removed as far as possible, under the general rules of ordinary surgical procedure. If this is limited in extent, a small curette through the artificial opening would probably accomplish all that is required. If, however, the necrosis has extended to the body and wing of the sphenoid, its removal can only be accomplished by access through the orbit.

### DISEASE OF THE FRONTAL SINUSES.

While simple catarrhal inflammation of the mucous membrane of the frontal sinuses, occurs in connection with a cold in the head, more frequently than that of any of the other accessory cavities, suppurative inflammation, on the other hand, is one of the rarest occurrences. This is probably due to the fact, that the infundibulum opens from the most dependent portion of the cavity, thus affording free drainage, while, at the same time, it is probably less liable to become firmly occluded. We find, then, here an accessory sinus, in which the anatomical conditions favoring the development of suppurative disease are absent. Thus Zuckerkandl<sup>1</sup> states that he has never met with a single instance of uncomplicated disease of this sinus.

ETIOLOGY.—The disease may arise as the result of any condition causing occlusion of the orifice of the sinus, such as hypertrophic rhinitis, deflection of the septum, the presence of tumors in the nasal cavity, or any other obstructive lesion in the nasal passages. This, however, is a exceedingly rare event. Far more active agents in the production of the disease are traumatism, maggots in the nose, gonorrhœa, syphilis, scrofula, disease of the ethmoidal sinus, or the development of tumors within the sinus itself.

PATHOLOGY.—The changes which take place in the membrane, consist briefly in hyperæmia, with hyper-secretion, which, as the result of retention, gradually changes into a suppurative process, and in connection with this, the morbid process gradually invades the whole thickness of the mucous membrane, causing marked tumefaction with resultant periostitis, and the development of exostoses or bony plates. In fact, the pathology of disease of the frontal sinus differs in no respect from that of disease of the antrum already described.

<sup>1</sup> "Anatomie der Nasenhöhle," Vienna, 1882, p. 168.

**SYMPTOMATOLOGY.**—The earliest symptoms which should direct attention to a diseased condition of these sinuses, is frontal headache, which may develop into pain of an exceedingly distressing character, increasing as the accumulated secretions gather and distend the sinus. A certain amount of relief is gained with the escape of pus, which flowing into the nasal cavity, is discharged through the nose. It is bright yellow, and at first is exceedingly offensive in character. As the flow becomes established, however, the fetor in a measure disappears. The headache is usually persistent, although occasionally it may assume an intermittent type. It is increased by mental effort, or the use of alcohol, and at times assumes the character of sick headache, being attended with nausea and vomiting. If the pus accumulation in the sinus is large, and its exit obstructed, the roof of the orbit may be so far crowded downward as to produce displacement of the eyeball with diplopia or amaurosis. At the same time, the anterior wall of the cavity may be so far displaced as to produce notable facial deformity. If the posterior wall of the sinus is displaced, it will be indicated by symptoms referable to the brain, such as dulness or apathy, with increased headache, or sleepiness. The brain symptoms, however, are very apt to be obscure, as is usually the case when pressure occurs on the anterior lobes, although Otto, as quoted by Schech<sup>1</sup> cites a case where displacement of the posterior wall of the sinus gave rise to unilateral paralysis. If the disease goes on so far as to produce erosion of the posterior wall, with the escape of pus into the brain cavity, the ordinary symptoms of meningitis supervene; on the other hand, a cerebral abscess may develop without perforation of the bony wall of the sinus. In the same way, erosion of the roof of the orbit may occur, resulting in the escape of pus, and the development of an abscess in this cavity. In this connection it should be borne in mind, as stated by Zuckerkandl,<sup>2</sup> that a congenital defect occasionally occurs in the development of the bones of the orbit, by which a permanent opening exists in this plate, through which pus from the frontal sinus may make its way into the orbital cavity, without erosion or necrosis.

**DIAGNOSIS.**—The history of the case will often afford diagnostic points, leading to the suspicion of the existence of frontal disease, as gonorrhœa, maggots, syphilis, etc. The pus discharge presents the ordinary characteristics of disease of the accessory sinuses, and makes its appearance in the nasal cavity as a bright-yellow healthy pus, flowing over the middle turbinated bone rather nearer the anterior extremity, and is discharged usually through

<sup>1</sup> "Diseases of the Mouth, Throat, and Nose," Eng. ed., Edinburgh, 1886, p. 279.

<sup>2</sup> *Op. cit.*, p. 168.



the nostril. In connection with this the diagnosis usually should be fairly well established, by the existence of frontal pain, tenderness upon pressure, possible dulness on percussion, as compared with the opposite side, and if distention occurs, the gross evidences of the disease as shown by external deformity, or displacement of the orbital plate.

PROGNOSIS.—Simple catarrhal inflammation of the frontal sinus usually undergoes resolution spontaneously. In suppurative disease, this tendency is not remarkable, and, although the prognosis is rarely grave where the disease is uncomplicated, its course is somewhat lengthened and tedious, unless arrested by proper remedial measures. Its tendency is not toward the development of necrosis, but to the accumulation of pus in the sinus, with distention and encroachment upon neighboring cavities, as in the following case reported by Knapp<sup>1</sup>:

A woman, aged 30, had suffered for two years from headaches of a more or less violent character, in which the pain seemed to centre itself about the root of the nose at times. Six days before Dr. Knapp saw her, she was seized with a chill, which was followed by a slight swelling of the upper eyelid, with protrusion of the eye. On examination the outer half of the supraorbital margin was red, swollen, and painful on pressure, and the swelling was close to the bone. Ophthalmoscopic examination showed slight œdema and congestion of the papilla. A diagnosis of incipient abscess was made. Two days later, the abscess had become very large, and was opened at the junction of the outer and middle thirds of the upper lid. The wound discharged for a few days, and the symptoms apparently disappeared. Six days after the operation, she was quite suddenly seized with headache, and became very weak, followed by vomiting, stupor, and slow pulse (50–60). These symptoms continued for several days, and the patient finally died of cerebral abscess of the left frontal lobe. On the post-mortem examination, the convolutions of the left frontal lobe were flattened; there was some discoloration of the base of this lobe, and the dura mater was adherent for an area of one cubic centimetre. The dura was not perforated. There was discoloration of the cerebral surface of the orbital roof at the point of adherence of the dura mater, and over an area of one cubic centimetre on the anterior and inner roof of the orbit. The bone was necrotic at this point and a probe could be passed through it into the frontal sinus. The frontal sinus was dilated, and both the frontal and ethmoidal sinuses were filled with pus. The cerebral abscess probably developed from the patch of necrosed bone already described. It will be noticed in this case, that there was no purulent discharge from the nasal cavity, which would indicate that a complete closure of the infundibulum existed, a condition which probably had much to do in causing the invasion of the cerebral cavity.

Still another case was seen by Knapp,<sup>2</sup> which presents points of interest, as follows:

<sup>1</sup> "Contribution to the Pathology of the Frontal Sinus," *Archives of Ophthalmology*, vol. ix., No. 2, 1880.

<sup>2</sup> *Loc. cit.*

A man, aged 30, presented with the history of having suffered from a tumor the size of a walnut which had existed at the inner angle of the eye, for about six years, and which had latterly given rise to a slight exophthalmos. The growth was accompanied with considerable pain, and varied notably in size at different periods of time, each temporary swelling being accompanied by an exacerbation of pain. When seen by Knapp, there had been an exacerbation of all the symptoms for three months. An incision of the tumor showed it to be an abscess, after the evacuation of which, it was found that both the frontal sinus and ethmoidal cells were involved, and furthermore, that there was polypoid degeneration of the lining mucous membrane, the removal of which resulted in a complete cure at the end of three weeks.

In two cases reported by Pettesohn,<sup>1</sup> nasal discharge had been a symptom for some time. There was a tumor at the supra-nasal angle of the orbit, and œdema of the upper lid. Both cases were cured by incision.

**TREATMENT.**—The primary treatment of the affection consists in the use of cleansing disinfectant lotions, in the nasal cavity, by means of the syringe or atomizer, in order to remove such secretions as may lodge in this region, and at the same time establish, as far as possible, free drainage through the normal opening. This, however, in many cases fails to accomplish all that is desired, and hence it becomes necessary to make an artificial opening into the sinus through the bony walls, of a sufficient size and accessibility as to admit of their thorough cleansing, and at the same time, secure free drainage. The point usually selected for this operation is immediately below the eyebrow, and near the bridge of the nose, where an incision having been made through the integument, the periosteum is elevated, and subsequently the perforation made into the frontal sinus by means of a drill, trocar, or trephine. In this manner, the opening is made as nearly as possible in the dependent portion of the cavity. Where an orbital abscess exists, of course the first indication is to open this by free incision, after which an exploration with a probe would reveal, in most cases, an already existing perforation of the orbital plate, and in those rare instances in which no opening exists here, the bone will be found to be in a condition which will easily admit of perforation. The opening here must be made sufficiently large to give free access to the sinus. It would seem that, even where no orbital abscess exists, we have at the upper and inner angle of the orbit, just within the supraorbital ridge, a site which might well be chosen for an artificial opening, in that the bony plate is quite thin, and the cavity would be surely and thoroughly opened, and furthermore, the resulting cicatrix would be less noticeable. Where the infundibulum is obstructed, it is a matter of considerable importance, even after the artificial opening

<sup>1</sup> "Centralblatt für prakt. Augenheilkunde," Feb., 1888.

into the frontal sinus has been established, to reopen also the normal orifice, in order that proper through-and-through drainage may be secured. Schech<sup>1</sup> advises the dilatation of the normal orifice by means of a probe passed through the artificial opening, after opening the frontal sinus, and if necessary the forcible passage of a trocar through into the nasal cavity, and the insertion of a drainage tube into the opening thus made. Such a procedure, however, would rarely be necessary. After access has been gained to the sinus, thorough exploration should be made with a probe, which should reveal the presence of necrosis or tumors, and furthermore, would make known the involvement of the neighboring sinuses if such exist. Thus, in a case which came under the observation of Welge,<sup>2</sup> the nose, orbit, antrum of Highmore, and the frontal and ethmoidal sinuses were all thrown into one cavity, so widely had the diseased process extended, as the result, apparently, of a primary disease of the ethmoidal labyrinth.

In some cases it would seem that the disease may be cured by the removal of such obstructing lesion as may be found in the nasal cavity; thus Schmiegelow<sup>3</sup> has reported a case of suppurative disease of the frontal sinuses, cured by the removal of nasal polypi. Seiss<sup>4</sup> goes so far as to state that in the majority of cases the disease can be controlled by "pinning down" the swollen tissues in the nasal cavity which occlude the normal orifice, using applications of chromic acid, after the manner described in Chapter IX. While not indorsing so broad a statement, I am yet disposed to think that much can be accomplished by measures of this character, and yet I think that the statement is fully justified, in cases such as Schmiegelow's, and those referred to by Seiss, that there may have been a possible error in diagnosis, for in any given case of suppurative disease of one of the accessory sinuses, which is dependent upon some intra-nasal lesion, and which is cured by the removal of that lesion, I doubt very much whether it is possible in every case to determine with certainty, which of the accessory sinuses is involved. As stated in discussing the subject of disease of the antrum, I believe that suppurative disease is set up in this cavity, as the result of a morbid process in the nasal cavity, far more frequently than in any of the other accessory sinuses.

#### DIFFERENTIAL DIAGNOSIS BETWEEN DISEASE OF THE ACCESSORY CAVITIES.

While the recognition of suppurative disease of one of the accessory sinuses of the nose is comparatively an easy matter, the de-

<sup>1</sup> Op. cit., p. 284.

<sup>2</sup> "Diss. de Morbo Sin. Frontal.," Göttingen, 1786.

<sup>3</sup> Hospitalstidende, Feb., 1888.

<sup>4</sup> Phil. Med. News, January 5th, 1889.



termination of which cavity is affected is often involved in considerable obscurity, and hence it would seem not out of place, to group together here the different symptoms, with their special diagnostic significance.

A pus discharge from the nose is characteristic of disease of all the sinuses, excluding those exceptional cases in which the normal orifice is completely occluded, in which case the abscess is forced, as it were, into neighboring regions, such as the orbital or cranial cavity. In antral and frontal disease, and in disease of the anterior ethmoidal cells, the pus makes its way anteriorly, and is discharged from the nostril, while in disease of the posterior ethmoidal and the sphenoidal sinuses, it makes its way into the pharynx. In antral disease, the discharge is intermittent, and shows a certain degree of periodicity. In disease of the other cavities it is usually continuous. Inclining the head well forward, or lying on the unaffected side, favors a discharge from the antrum, while the upright position favors a discharge from the other sinuses.

Unilateral pain is present in all the affections. In antral disease, this is most marked in the region of the check-bone and teeth. In frontal disease, it becomes a frontal headache, while in the ethmoidal and sphenoidal affections, it is more deep-seated, and locates itself at the roof of the orbit.

Exophthalmos is the rule in ethmoidal disease, but also is met with somewhat frequently in connection with disease of the sphenoidal sinuses. It is exceedingly rare in connection with disease of the antrum, and only occurs where the abscess ruptures into the orbit. In frontal disease, bulging of the orbital plates is not a rare event, but in this case the eye is apt to be crowded downward and outward, so that the eyeball is not protruded to the same extent as is liable to occur in ethmoidal disease. Diplopia, when present, is the result of displacement of the eyeball, and therefore constitutes a diagnostic sign of no additional value.

Sudden blindness is due to pressure on the optic nerve as it passes through the optic foramen and is, therefore, only met with as a symptom in connection with sphenoidal disease; although, as Ziem has shown, the field of vision may be narrowed in disease of the antrum.

Ptosis is the result of pressure on the third nerve as it passes through the sphenoidal fissure. This also, therefore, would point to involvement of the sphenoidal labyrinth.

Strabismus would be occasioned by a certain differentiation of the pressure on the nerves passing through the sphenoidal fissure, and would also indicate the existence of sphenoidal disease.

Facial neuralgia may occur in connection with disease of any of

the sinuses, although it is most constantly met with in disease of the antrum, less frequently in connection with sphenoidal disease, and with the greatest rarity in connection with ethmoidal and frontal disease.

Fetor is present in a very mild degree in disease of all the sinuses, and may possess a certain amount of intermittency as suggested by Luc,<sup>1</sup> thus pointing more directly to disease of the antrum, in that the fetor probably attends the escape of pus after a temporary retention.

The frequency with which the different sinuses are affected with suppurative disease, affords a certain amount of aid in diagnosis. Antral disease is by far the most frequently met with, while in the order stated the disease is less frequent in the ethmoid and sphenoid sinuses, while suppurative disease of the frontal sinus is the rarest of all.

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<sup>1</sup> Jour. de Méd. de Paris, 1887.

## SECTION II.

### DISEASES OF THE NASO-PHARYNX





# DISEASES OF THE NASO-PHARYNX

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## CHAPTER XXXIX.

### THE ANATOMY AND PHYSIOLOGY OF THE NASO-PHARYNX.

THAT space which lies behind the posterior nares and the oral cavity, and which extends from the basilar process of the occipital bone to the upper border of the larynx, has usually been described, in works on anatomy, as constituting a single cavity, under the name of the pharynx. Writing on this subject some years since,<sup>1</sup> I urged that, from a physiological point of view, this space should be regarded as consisting of two separate and distinct cavities, the upper pharynx and the lower pharynx, or using perhaps a better designation, the naso-pharynx and the oro-pharynx, in that the former belongs to the air tract with certain somewhat adventitious functions perhaps connected with the food tract, while the latter belongs essentially to the food tract, both physiologically and in its anatomical construction, its connection with the air tract being purely adventitious. The upper space has been designated, somewhat indifferently, as the upper pharynx, the vault of the pharynx, the post-nasal space, and the naso-pharynx. In our consideration of the subject, I prefer the use of the term naso-pharynx, as more clearly defining the region under discussion.

#### ANATOMY OF THE NASO-PHARYNX.

This cavity consists of a somewhat quadrilateral-shaped space, lying immediately behind the posterior nares, and bounded as follows: Its roof is formed by the basilar process of the occipital bone, together with a small part of the posterior portion of the body of the sphenoid, while it terminates below in an imaginary plane opposite the border of the palate. The posterior wall is formed by the spinal column, the prominence of the arch of the

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<sup>1</sup> N. Y. Med. Record. Nov. 6th, 1880.

atlas being often recognized at about the point where the vertex of the palatal arch in contraction impinges upon the pharyngeal wall. From this upward, the wall curves forward. The anterior boundary is formed by the two oval openings of the posterior nares, together with the posterior border of the vomer or septum, which presents a somewhat sharp edge below at its articulation with the hard palate, but expands somewhat above, to articulate with the rostrum of the sphenoid. Each lateral wall is marked by the opening of the pharyngeal orifice of the Eustachian tube, which presents as a somewhat elongated or ovoid funnel-shaped orifice, or as Roosa<sup>1</sup> describes it, "a trumpet-shaped orifice, nine millimeters high and five millimetres broad." The opening of the tube is partially surrounded by a well-defined cartilaginous ridge, which is mainly formed by a projection of the cartilage which enters into the formation of the tube proper. This eminence is very well marked posteriorly and above, while anteriorly it is less prominent, and immediately below the orifice it is absent. As the mucous membrane is reflected over this cartilaginous ridge or cushion of the Eustachian orifice as it is usually termed, it is thrown into a fold, as it passes from the lower termination of the posterior section of the ridge to the pharynx below, forming what has been designated by Luschka as the *plica salpingo-pharyngea*, while by its reflection from the anterior portion of the ridge a less prominent fold is formed, which extends from the anterior border of the tube to the soft palate. This is called by Luschka the *plica salpingo-palatina*. Immediately behind the Eustachian orifice, and lying between the cartilaginous cushion and the posterior wall of the pharynx, is noticed an elongated depression, the *fossa of Rosenmüller*. This fossa varies somewhat in shape and depth in different subjects, although it is usually elongated, and much broader above than below, and is mainly of interest in that in introducing a Eustachian catheter, its point is usually first engaged in this depression. While at rest, the Eustachian orifice is closed, and is only opened as the result of muscular contraction in the various functional movements of the fauces.

The muscle which acts most prominently as a dilator of the tube, is the tensor palati muscle, or as it is generally named by otologists, the *spheno-salpingo staphylinus*, or the *dilator tubæ*. It arises from the base of the internal pterygoid plate of the sphenoid bone and the scaphoid fossa, and from the cartilaginous portion of the Eustachian tube throughout its whole length. It then passes downward, forward, and inward, and winds around the hamular process of the sphenoid, and is inserted into the soft palate.

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<sup>1</sup> "Dis. of the Ear," 3d ed., 1876, p. 209.



It enlarges the calibre of the tube by drawing its anterior cartilaginous margin downward and forward.

The levator palati, whose action is less marked than the action of the former in opening the Eustachian tube, and yet undoubtedly possessing a certain function in this direction, is a long, rounded, muscle, arising from the petrous portion of the temporal bone, and from the cartilaginous portion of the tube, from which, passing downward and inward, it spreads out into a broad tendon, and is inserted with its fellow into the median line of the soft palate, the fibres blending with the mucous membrane of this structure. By its contraction, it lifts, as it were, the lower edge of the collapsed tube into such a position, that its lateral walls separate, and the lumen becomes patulous.

The palato-pharyngeus, which arises from the soft palate, the posterior portion of the hard palate, and from the cartilaginous portion of the Eustachian tube, passes downward to the thyroid cartilage, some of the fibres blending with the corresponding muscle of the opposite side. Its action is to fix the cartilaginous portion of the tube to which it is attached, and thus aid the action of the levator palati.

The orifice of the Eustachian tube is usually described as opening into the anterior and lower portion of the lateral wall of the naso-pharynx, opposite the posterior termination of the lower turbinated bone, from which it is distant about three-eighths of an inch, while its average distance from the nostril is, according to Luschka,<sup>1</sup> two and three-quarters inches, although, according to Mackenzie,<sup>2</sup> the distance is three and one-fifth inches. Kostonecki,<sup>3</sup> however, has shown, that there are very great variations in the locality of this orifice, as regards its vertical position, in that in many cases it is found much higher in the lateral wall of the pharynx than in others. This fact, however, is constantly brought to the notice of otologists in passing the Eustachian catheter, in that in many cases the tip must be carried well upward, in order to engage in the tubal orifice.

The cavity of the upper pharynx differs greatly in different individuals, without reference to their physical development. Luschka's measurements, however, are as follows: its vertical and antero-posterior measurements are about the same, viz., three-quarters of an inch, while its width is about one and three-eighths inches. The fibrous basement structure of the naso-pharynx consists of a thick aponeurosis, which has its attachment to the basi-

<sup>1</sup> "Der Schlundkopf des Menschen," Tübingen, 1868.

<sup>2</sup> "Diseases of the Throat and Nose," Phila., 1884, vol. i., p. 18.

<sup>3</sup> Arch. für Mik. Anat., 1887, vol. xxix., p. 539.

lar process of the occipital bone, and the petrous portion of the temporal. Beneath this tissue are found certain muscular structures, involved in the movements and support of the head. Its internal surface is lined with mucous membrane, which differs in no essential features from the mucous membrane of the respiratory tract. It is richly endowed with mucous glands, both the tubular and racemose varieties, while its epithelial surface is covered with columnar ciliated epithelium.

That however, which gives the pharyngeal vault an especial interest, and also endows it with certain important functions, is the crowding together of a large number of glands into a distinct mass, in the upper and central portion of the cavity, constituting what is known as the pharyngeal tonsil, or the third tonsil, and sometimes called Luschka's tonsil, in that this writer first gave us a complete anatomical description of it, although according to Cohen<sup>1</sup> the mass was recognized and dissected by William Hunter in the last century. I find, however, no record of this in any of Hunter's writings. According to Luschka,<sup>2</sup> there is always present in this region, although in varying degrees of development, a soft mass of tissue, of about one-quarter of an inch in thickness, spread over the roof and posterior wall of the naso-pharynx, covering the whole extent of the basilar process of the occipital bone. It extends the whole width of the pharynx, to the fossæ of Rosenmüller, and even encroaches upon the cartilaginous eminences surrounding the Eustachian tube. The gross appearance of this mass of glands varies somewhat, presenting occasionally a soft cushion-like outline covered with small rounded elevations, while in others it is traversed by fissures in various directions. The most constant appearance, however, and that seen in the largest majority of cases, is that in which the mass is traversed longitudinally by a series of fissures or indentations, of perhaps a quarter of an inch in depth, with a slight disposition to branch, as it were, giving rise to a sort of crow's-foot appearance on the surface. (See Figs. 121, 122.) At the lower portion of the pharyngeal tonsil, in the median line, Luschka describes an opening, about the size of the head of a pin, sometimes larger, sometimes smaller. This opening leads into a small sac, about three-quarters of an inch long, and a quarter of an inch wide, to which Luschka gave the name *bursa pharyngea*, a term already used by J. O. Meyer,<sup>3</sup> to describe a similar anatomical condition found in the pharynges of certain of the mammalia, in that this sac formed a bursa between the adenoid tissue already de-

<sup>1</sup> "Diseases of the Throat and Nasal Passages," Phila., 1879, p. 253.    <sup>2</sup> *Op. cit.*

<sup>3</sup> "Neue Untersuchungen auf dem Gebiete der Anat. und Physiologie," Bonn, 1842.

scribed, and the basilar process of the occipital bone. The anterior wall of this cavity is lined with glandular tissue. The tissue forming the posterior wall, is, according to Luschka, joined by a distinct ligament to the basilar process of the occipital bone. Ganghofner<sup>1</sup> and Schwabach<sup>2</sup> deny its existence as a distinct anatomical structure, taking the ground that this bursa, so-called, is really the recessus pharyngeus medius, or simply the median fissure of a normal pharyngeal tonsil, or possibly an hypertrophied one, which undergoing the changes incident upon maturity, has by a process of unfolding, as it were, or shrinking up upon the median line, resulted in an adhesion of the superficial layers of the adenoid tissue over the median fissure, in such a way as to form this bursa-like cavity. It is difficult to understand why nature should have found it necessary to establish a bursa here, for any purpose of function, especially one of the size Luschka describes. Certainly there is no function of the pharynx which requires the presence of such an appendix. Hence, the objections made by Ganghofner and Schwabach seem to be exceedingly well grounded, for certainly Luschka's original description scarcely strikes one as that of a permanent and constant anatomical condition. Moreover, Luschka describes it as a condition present in only a certain proportion of cases. I think, then, that we must abandon Luschka's idea of a normal pharyngeal bursa in this region, and regard the condition he describes as the adventitious result of certain morbid conditions of the glandular structure in this region, as described by Ganghofner.

This region derives its arterial supply from the ascending pharyngeal branch of the external carotid, and the ascending palatine branch of the facial, together with the palatine and the sphenopalatine branches of the internal maxillary. The veins open into the internal jugular. The nerve supply is derived mainly from the



FIG. 121.—The Glandular Structures at the Vault of the Pharynx (Luschka). 1, 1, Pterygoid processes; 2, vomer; 3, posterior portion of the vault of the nasal fossae; 4, 4, Eustachian tubes; 5, orifice of the bursa pharyngea; 6, 6, Rosenmüller's fossae; 7, median folds formed by the glandular tissues.

<sup>1</sup> "Ueber die Tonsilla und Bursa Pharyngea." Sitzungsbericht der k. Academie der Wissenschaften, Bd. lxxviii., Abth. iii., Oct. 10th, 1878.

<sup>2</sup> Arch. für Mik. Anat., 1887, vol. xxix., p. 61 et seq.



second division of the fifth pair, together with branches from the glosso-pharyngeal and vagus.

### PHYSIOLOGY OF THE NASO-PHARYNX.

While the naso-pharynx is situated apparently in the continuity of the respiratory tract, and furthermore its mucous membrane shows



FIG. 122. — Glandular Structures of the Pharyngeal Vault, seen in Antero-posterior Section.

the anatomical characteristics of the mucous membrane lining the respiratory tract, namely in the fact that it is covered with columnar ciliated epithelium, yet I am disposed to think that the function of the naso-pharynx has mainly to do with the food tract. In the ordinary process of deglutition, it is absolutely necessary that the lower pharynx should be thoroughly lubricated by mucus, in order that the bolus of food shall pass over it without hindrance. Now, as we know, the lower pharynx is very sparsely endowed with glandular structures. It is lined by a hard dense membrane, fitted eminently to permit without injury the passage of harsh, and oftentimes irritating particles of food, but it is endowed with a very scanty secreting apparatus. The glands necessary to furnish this region with a proper lubricant, were they imbedded in the tissue of the lower pharynx, would be exceedingly liable to injury, from the constant irritation of food in the act of deglutition. Hence, we find them removed, as it were, to the three sides of the pharynx most convenient for their location, namely, to the well-protected recess found between the two pillars of the fauces, where they form the faucial tonsils, and to the still better protected recess, the vault of the pharynx. In these three regions we find masses of glands, which pour out large

quantities of mucus, whose sole and only function is to thoroughly lubricate the bolus of food, and facilitate its passage down into the œsophagus. The vault of the pharynx affording the best protection, necessarily becomes the site of the largest aggregation of these glands, and as Luschka has shown us, nature has chosen this locality for the main distribution of the glandular structures designed for this function.

The normal secretion from the pharyngeal tonsil consists of an absolutely clear, transparent, somewhat viscous mucus, of the ap-

pearance and consistency of the white of an egg. Not infrequently, as we examine the lower pharynx, we will notice a large mass of this mucus escaping from beneath the palate, and passing into the pharynx below, from one to three drachms in amount, this without consciousness on the part of the patient. This is the healthy secretion of the glands, and the secretion of this mucus is their main function. The pharyngeal vault being, adventitiously as it were, a part of the air tract, it is of course endowed with certain anatomical features, characteristic of the air passages. Its main function, however, I regard as a sort of diverticulum of the food tract, for the safe lodgment of these glands.

The function of this region in connection with the auditory apparatus will more properly be discussed in a later chapter. Its function as a resonant chamber for the voice is also somewhat secondary, and possesses no point of special importance.

## CHAPTER LX.

### ACUTE NASO-PHARYNGITIS.

THIS term is used to designate a disease, frequently met with in the spring and fall months, and which in many of its features closely resembles an ordinary acute rhinitis, or cold in the head, and yet differs in a notable degree from this affection, both as to the region involved in the inflammatory process, and in the character of the symptoms. The disease consists essentially in an acute inflammation of the mucous membrane lining the vault of the pharynx, and hence we use the term acute naso-pharyngitis, which is a somewhat awkward and perhaps unfortunate designation, and yet I know of no better one, under which to definitely describe the affection.

ETIOLOGY.—Exposure to cold we regard as the prominent exciting cause of all acute inflammatory processes involving the mucous membrane of the upper air passages. Aside from this, I know of no cause for the disease. As a predisposing cause, however, we recognize a previously existing naso-pharyngeal catarrh probably in all cases, adopting the same view here, as that already expressed in regard to chronic catarrhal affections of the nasal passages, that the chronic process is the first to arise, and that recurrent attacks of acute inflammation become one of its most prominent symptoms. It is met with much more frequently in adult life than in youth, in that at this period of life the naso-pharynx is perhaps the most frequent site of a chronic catarrhal process, and thereby the weakest portion of the upper air-tract. An ordinary cold, as we call it, in very young children occurs usually in connection with adenoid disease of the pharyngeal vault, or with the purulent rhinitis of childhood. This tendency disappears at puberty or perhaps before, after which an exposure results more commonly in an ordinary acute rhinitis, or a typical cold in the head. After this tendency has persisted for a somewhat lengthy period of time, encouraged perhaps by irregularities in habit of life, indiscretions, improper clothing and other errors of hygiene, the pharyngeal vault becomes involved, as a secondary result of the morbid process in the nasal passages, and becomes the seat of an inflammatory process in con-



nection with the attacks of acute rhinitis, and still later, the tendency to acute rhinitis disappears, and we have the colds resulting in an acute inflammation at the pharyngeal vault. In other words, chronic inflammatory processes tend to pass downward in the air passages, carrying with them the tendency to recurrent attacks of acute inflammation. Aside from these considerations, the predisposing causes of the disease will be more particularly discussed in the consideration of the general subject of naso-pharyngeal catarrh, in another chapter.

**SYMPTOMATOLOGY.**—The attack comes on somewhat suddenly, as the result of exposure, and usually is marked by notable constitutional disturbance, as shown by a certain amount of febrile movement, as marked by flushed skin, headache, loss of appetite, etc. The thermometer may indicate a temperature not over perhaps  $100^{\circ}$  to  $101^{\circ}$ , and yet the general disturbance is more marked than would be expected from so low a degree of fever, in that the general malaise and feeling of illness and prostration, oftentimes will compel a patient to abandon his usual occupation, and perhaps confine himself to his room or even bed.

One of the earlier sensations is a feeling of burning or dryness, referable to the back of the throat, or as the patient usually expresses it, in the roof of his mouth, swallowing becoming painful, and even to an extent difficult. This is due to the abnormal dryness of the membrane, which, as we know, characterizes the first stage of all acute inflammatory processes in the upper air passages. Now in the nose, as we know, this first stage persists usually but a few hours, or at the utmost, a day. In the naso-pharynx, however, this first stage will oftentimes last two, three, or even four days, constituting a period of considerable discomfort and even distress to the patient. In connection with this, as indicating a close connection between the naso-pharynx and the digestive apparatus, there is liable to be a torpid condition of the bowels, or even obstinate constipation, in connection with complete anorexia, and a tendency to nausea.

The second stage of the attack is characterized by the setting in of a more or less profuse muco-purulent discharge from the affected region, which passes down behind the palate and into the fauces, from whence it is either expectorated, or passes into the œsophagus, and is swallowed, or, again, it may make its way into the nasal cavities, and is voided through the anterior nares.

This secretion consists of a somewhat thick, grayish, opaque mucus, which is voided in considerable quantities. The setting in of the secretion seems, to an extent, to aggravate the gastric disturbance, especially giving rise to a tendency to nausea or vomit-

ing, the appetite being, at the same time, considerably impaired. The mucus passing into the nasal cavities, seems to excite a certain amount of irritation in this region, giving rise to sneezing and perhaps a watery discharge from the nose, although the secretion that is voided anteriorly I think usually has its source in the pharyngeal vault. The sneezing and irritation often lead to the idea that the attack is one of ordinary cold in the head, and yet it is never characterized by that distressing nasal stenosis, and intense form of irritation, which occurs in connection with acute inflammation of this locality. This stage of the attack may persist from ten days to two weeks, with no very marked change in the symptoms, either of the local discharge, or of the general feeling of malaise and prostration.

The third and last stage of the disease, consists of a gradual letting up of the subjective symptoms, and a diminution of the discharge. The voice is affected very early in the attack, and in a somewhat peculiar manner, which is almost characteristic of this form of cold, in that it has a curious, hoarse, metallic ring to it, which weakens the tone, although it is never entirely lost. This is due to a certain amount of sympathetic irritation or hyperæmia of the mucous membrane lining the larynx, which merely impairs the tone, the resonant chambers not being encroached upon. Pain is always a prominent feature of this form of cold during all stages of the attack. This is usually referable to the roof of the mouth, or upper portion of the throat, from which point it seems to radiate toward the angles of the jaw, and even may extend up to one or both angles of the face, giving rise to a facial neuralgia. This pain is of a purely neuralgic character, and is due probably to the involvement of the terminal filaments of the nerves in the pharyngeal vault. Why a facial neuralgia should so frequently complicate the disease, is by no means easy of explanation, unless on the ground that there is in the disease itself, a prominent neurotic element. Certainly it occurs frequently in women of a nervous and perhaps hysterical temperament more frequently than in others, and where met with in such patients, it assumes an aggravated form, and moreover, the nervous symptoms are more distressing. I think something of the same sort also is noticeable in men, especially those who have passed middle life, and have arrived at that age, when any attack of illness is watched with a certain amount of exaggerated apprehension. Pain in the back of the neck is also prominent in these cases, which consists of a stiffness or soreness in the large muscles, rather than in a neuralgic pain. Cough is rarely met with, although a more or less disagreeable sense of itching or scratching about the fauces is liable to be a prominent source of

complaint. Furthermore, the disease does not show any marked tendency to extend down into the trachea and bronchial tubes, although it almost invariably involves the lower pharynx. This lack of tendency to extension is probably due to the fact that nasal respiration is not ordinarily interfered with, and that breathing takes place through the normal passages, and furthermore that the great respiratory function of the nose is unimpaired, which as we know serves very largely to protect from irritation the mucous membrane of the bronchial tubes and the passages below. When we consider that the mucous membrane of the upper and lower pharynx is involved in the acute inflammation, we can easily understand how symptoms referable to the ear should, in most cases, be a prominent symptom, owing to the fact that the inflammatory process extends to the orifice of the Eustachian tubes, resulting in a temporary stenosis, with impairment of hearing, and a sense of dulness in that region. This symptom, however, it should be stated, is more characteristic of the second stage, during which there is a more or less profuse secretion in the pharyngeal vault. During the first stage, the mucous membrane is dry, and the parts which it covers are, as we have seen, stiff and somewhat immovable. This condition extends somewhat to the muscular structures which act upon the palate, as the result of which, the movements of the palato-pharyngeus muscle is impaired, giving rise to the difficulty in deglutition, already referred to. Hence, in this first or dry stage, we find not infrequently that the Eustachian tubes are maintained in a closed condition, as evidenced by the fact that the patient hears his own voice with a distinctness which may be almost a source of distress. This symptom, however, of autophonia usually disappears with the setting in of the secretion, characteristic of the second stage.

**PATHOLOGY.**—Any discussion of the pathology of this affection would be purely speculative, in that I know of no special examinations of this tissue, in a state of acute inflammation, as ever having been made. We can only base our conclusions on the general laws, which govern a manifestation of an acute inflammation as affecting mucous membranes in general. This point has already been sufficiently discussed in a previous chapter (p. 51).

**DIAGNOSIS.**—These patients usually complain of a severe cold in the head and throat. Hence, our first impression is, that we have to deal with an acute rhinitis. This, however, will be completely eliminated by an examination through the anterior nares, which will reveal the turbinated tissues slightly swollen perhaps, and yet showing no evidence of acute inflammation. Moreover, both subjectively and on inspection, these passages will be found fairly open



to the current of inspired air. An examination of the fauces will reveal, in the first stage of the attack, an intensely hyperæmic and slightly swollen condition of the mucous membrane lining the lower pharynx, while its surface will usually present a dry and somewhat glazed aspect, the color being of a deep red, verging on a purplish hue. With the rhinoscopic mirror, the vault of the pharynx will present the same turgid condition, and a similar reddened color, with an entire absence of any evidence of secretion.

In the second stage, however, an examination of the fauces will show the membrane swollen, reddened, and coated with long stringy flakes of grayish opaque mucus, whose source evidently is in the pharyngeal vault. If we now inspect the upper portion of the nasopharynx, the same hyperæmic condition will be recognized, while its glandular tissues will be seen covered with patches or masses of the same grayish mucus, as was observed in the lower portion of the cavity. An acute rhinitis having been eliminated, the main point of diagnosis, here, would be to determine the absence of an acute follicular inflammation. This, of course, should be determined in the fact, that in the exudative form of the disease, there is a lack of the mucous secretion, while at the same time, the characteristic white spots, marking the existence of a croupous exudation in the crypts of the follicles, is absent. Of course, this last point is only fully determined, after a thorough cleansing of the pharyngeal vault by means of a spray through the nose, or a post-nasal syringe. Moreover, the latter disease, it should be borne in mind, is accompanied, especially in its earliest stages, by a temperature of from  $101^{\circ}$  to  $103^{\circ}$ , while in the catarrhal form of inflammation, the temperature rarely exceeds  $100^{\circ}$ .

PROGNOSIS.—These attacks involve no special danger to life, although they run a somewhat prolonged course, as already stated, and may last from ten days to two weeks, during which time the patient suffers, not only from the exceeding discomfort, and even distress of the local affection, but also notable general malaise, with prostration. In fact, during the attack, the patient is apt to think himself, and he really is, quite ill, and even incapacitated for his ordinary duties. The disease, however, shows no marked tendency to extend to the passages below, and generally terminates in complete resolution, or if the patient has previously suffered from nasopharyngeal catarrh, it simply leaves behind a somewhat aggravated form of the chronic disease. Mackenzie<sup>1</sup> who alludes very casually to this affection, and Sajous<sup>2</sup> who devotes a chapter to its consideration, seem to suggest that the acute form of the disease may de-

<sup>1</sup> "Dis. of the Throat and Nose," Amer. ed., Phil., 1884, vol. ii., p. 472.

<sup>2</sup> "Dis. of the Nose and Throat," Phila., 1886, p. 216.

generate into the chronic. As already stated, I think it is an almost invariable rule that the chronic inflammatory process precedes the acute, and that recurrent attacks of acute inflammation are to be regarded as a prominent symptom of the chronic lesion. It might be stated, in this connection, that the above writers, as far as I know, are the only ones who refer to this form of a cold.

TREATMENT.—At the onset of the attack, the effort should be made to break up the cold, in much the same way as we try to abort an attack of acute rhinitis. For this purpose, we may give ten grains of quinine, while, at the same time, certain measures are instituted for producing diaphoresis, such as the administration of hot drinks in connection with the hot foot bath, preference being given to this simple device, rather than a warm bath or the Turkish bath, either of which are to be regarded as involving a certain amount of risk of additional cold. The simple foot bath, producing moderate diaphoresis, should answer every purpose.

In this connection, also, we should bear in mind the intimate relation between the pharyngeal structures, and the digestive apparatus, a relation which has already been referred to, in connection with the symptoms which a cold of this kind gives rise to. Hence, we administer a full dose of calomel or blue mass, in connection with the quinine, usually ten grains of either being sufficient. This is given at bedtime, to be followed in the morning (and each morning during the existence of the cold) by a glass of Kissingen, Geyser, or Congress water, or indeed any of the milder bitter waters, the indication being to keep the bowels fairly well relaxed during the whole continuance of the attack, although the quinine and mercurial dose is usually not to be repeated after its first administration. If headache is a prominent symptom, perhaps we have no better remedy than the administration of antipyrine in doses of ten grains, to be repeated every hour, until relief is obtained, although it will rarely be found necessary, and perhaps not wise, to administer more than a third dose. Pain, as before stated, is always a prominent symptom, and for the relief of this, we administer some preparation of aconite, and, of these, none is so prompt and efficient in its action as the alkaloid aconitia, which is conveniently administered in the form of the tablet triturates or in granules, preference always being given to Duquesnel's preparation, as being, perhaps, the most reliable. This should be administered in doses of  $\frac{1}{800}$  of a grain every hour, in the case of a male, and every two hours, in that of a female, until the pain is relieved, or the constitutional effect of the drug is manifested, as shown by numbness and tingling about the fauces or lips, vertigo, or faintness. In administering so powerful a remedy as this, one of course

needs to exercise considerable care, and where it is impossible to see a patient soon, I have usually directed the drug in the above doses, to be taken every hour for three hours during the early morning until three doses have been taken, and to repeat the same process in the early afternoon, and again in the evening, if necessary.

I have rarely seen a case of acute naso-pharyngitis, with prominent neuralgic symptoms, in which the aconitia did not afford striking relief, and not only does it seem to control pain, but it seems to exercise a beneficial effect on the inflammatory process, and not infrequently it acts to completely arrest the attack.

The above measures go far toward supplying us with all the therapeutic methods necessary, in the management of an attack of acute naso-pharyngitis, although where the symptoms are persistent, and the attack prolonged, much aid will be afforded by the resort to local measures, and, of these, I should place as of the first importance, especially in the first stage of the attack, the reduction and control of the plethoric condition usually present in the turbinated tissues of the nasal cavity. This is accomplished by the local application of a strong solution of cocaine, for depleting the blood-vessels, after which, an application of chromic acid should be made after the manner already described in the treatment of hypertrophic rhinitis. This application will not only exercise a beneficial effect on the inflammatory process in the naso-pharynx, during the first stage, but it also serves to modify the nasal hyperæmia which complicates the attack. As soon as the stage of secretion sets in, and the excessive discharge from the pharyngeal vault makes its way into the nasal cavity, giving rise to irritation of these parts, local applications to the primary seat of the attack in the pharyngeal vault are always grateful, and afford a certain amount of relief. For this purpose, the ordinary nasal douche, with water as hot as can be borne (which is made saline by the addition of common salt), is of no little value, or the post-nasal pipe, in connection with the nasal douche is, perhaps, still better, as directing the stream immediately against the primary seat of the disease. This may be repeated as often as three or four times a day. Where the douche is not available, the spray, with any simple cleansing wash (making use of any of the formulæ already given in the chapter on hypertrophic rhinitis) will always be grateful to the patient. Snuffs and powders are of but little service in this form of disease, and may even be a source of annoyance. A two or four per cent solution of cocaine is always grateful, and affords relief to the painful symptoms for two or three hours, and possibly also modifies the inflammatory process. There is no possible objection to its use, and a preparation should always be placed in the hands of the patient, to use as freely as may be desired.



## CHAPTER XLI.

### NASO-PHARYNGEAL CATARRH.

THIS is a term used to designate a disease, characterized by an excessive secretion of mucus or muco-pus from the glandular structures of the vault of the pharynx, and which, passing down behind the palate, diffuses itself over the lower pharynx, where it gives rise to more or less irritation, and excites a constant hawking and expectoration in connection with an annoying nasal screatus. This term of naso-pharyngeal catarrh is a somewhat unfortunate one, and yet it is difficult to suggest a better term. According to Mackenzie it was first described by Frank in 1794, although in our own day, attention has been notably directed to it by Horace Dobell<sup>1</sup> who based his observations largely on clinical study, without making any definite suggestions as to the pathological character of the disease. Subsequently we have observations on the same subject by Wendt,<sup>2</sup> who first described two varieties, a hypertrophic and an atrophic, a classification subsequently adopted by Lennox Browne.<sup>3</sup> These writers, however, fail, it seems to me, to make any distinction between catarrh of the naso-pharynx, and catarrh of the nasal passages proper. Hence, their description of the disease is somewhat vague and unsatisfactory. Beverley Robinson,<sup>4</sup> however, following the same classification, was the first, I think, to describe the disease as confined to the naso-pharynx proper, which he designates as a follicular disease of the naso-pharyngeal space, still, however, describing two forms, a dry and moist. Mackenzie,<sup>5</sup> dropping this classification, discusses the subject somewhat at length, but still I think in a vague and indefinite way, under the general head of catarrhal disease, although he devotes a separate chapter to rhinitis, which he designates as chronic nasal catarrh. All these writers fail to give a clear clinical description of catarrhal inflammation of the naso-pharynx, in contradistinction to catarrhal inflammation of the mucous membrane lining the nasal cavity, and

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<sup>1</sup> "Lectures on Winter Cough," London, 1866, 1st ed.

<sup>2</sup> Ziemssen's "Handb. der Therapie," Leipz., 1874, Bd. vii.

<sup>3</sup> "The Throat and its Diseases," London, 1878, p. 153.

<sup>4</sup> "Nasal Catarrh," New York, 1880.

<sup>5</sup> "Diseases of the Throat and Nose," vol. ii., p. 472.

furthermore, fail to indicate what special pathological changes in the pharyngeal vault give rise to the disease. The same, I think, can be said of Cohen,<sup>1</sup> Seiler,<sup>2</sup> Woakes,<sup>3</sup> Schech,<sup>4</sup> and Sajous.<sup>5</sup> In 1885 Tornwaldt<sup>6</sup> comes forward in a somewhat elaborate monograph, in which he essays to prove that the very large proportion of cases are due to a morbid condition of the pharyngeal bursa, which manifests itself in two ways, (1) a chronic catarrhal inflammation of the pharyngeal bursa and (2) in a cystic degeneration of the bursa, with closure of its orifice. Tornwaldt bases these conclusions on a very careful examination of twenty-five cases, which he claims demonstrated not only his primary conclusion, but also that many cases of pharyngitis, laryngitis, bronchitis, as well as gastric catarrh, cough, asthma, headache, pains in the chest, affections of the ears, hyperæmia and hyperplasia of the nasal mucous membrane, and even nasal polypi, are directly due to a diseased condition of the pharyngeal bursa, and furthermore, that the treatment of the bursa is sufficient to give relief to all the foregoing train of concomitant affections. Following very soon after the publication of this monograph, Tornwaldt's disease, as it is called, became a subject of a somewhat animated discussion in the journals, Bresgen<sup>7</sup> Keimer<sup>8</sup> and Lennox Browne<sup>9</sup> taking issue with Tornwaldt's view purely on clinical grounds; while, on the other hand, with equal positiveness, we find Broich<sup>10</sup> and Luc<sup>11</sup> claiming to have observed all that Tornwaldt observed, in their examination of the nasopharynx, and to have had equal success in the treatment of the pharyngeal bursa, as far as the catarrhal inflammation of this region is concerned, although failing to notice any cases of cystic degeneration. Both these writers, also, claim to have cured nasal disease by treatment of the pharyngeal bursa alone. Schwabach,<sup>12</sup> discussing the question from a purely anatomical point of view, and basing his conclusions on a series of investigations upon the dead body, comes to the conclusion that the bursa pharyngea is not a special anatomical formation, but is merely a portion of the pharyngeal tonsil, and, therefore, that it has no independent pathological char-

<sup>1</sup> "Dis. of the Throat and Nasal Passages," N. Y., 1879.

<sup>2</sup> "Diseases of the Throat," Phila., 1883.

<sup>3</sup> "Post-Nasal Catarrh," Phila., 1884.

<sup>4</sup> "Dis. of the Mouth, Throat, and Nose," Engl. ed., 1886.

<sup>5</sup> "Dis. of the Nose and Throat," Philadelphia, 1886.

<sup>6</sup> "Ueber die Bedeutung der Bursa Pharyngea," etc., Wiesbaden, 1885.

<sup>7</sup> Deut. Med. Woch., 1887, No. 5, p. 86.

<sup>8</sup> Monatsschrift für Ohrenheilk., 1886, No. 4.

<sup>9</sup> "The Throat and its Diseases," London, 1887, 2d ed., p. 509.

<sup>10</sup> Monatsschrift für Ohrenheilk., 1886, Nos. 5, 6, 7.

<sup>11</sup> La France Médicale, 1886, Nos. 120 and 121.

<sup>12</sup> Arch. für Mik. Anat., 1887, vol. xix., p. 61.

acter. Notwithstanding the criticism of Bresgen and others, Tornwaldt's propositions are laid down with so much clearness, and his clinical cases reported with so great accuracy, that I think we must accept them as demonstrating the fact that a certain proportion of cases of catarrhal disease have their source in this so-called pharyngeal bursa. The question as to whether this cavity, which Luschka has demonstrated to exist in the pharyngeal vault, is a true bursa, has already been discussed in the section on the anatomy of the naso-pharynx, where the view was taken, that the weight of evidence goes to show that it is not a constant anatomical condition, but rather the result of a diseased action of the normal lymphoid structures found in that region. The position, then, which we are compelled to take in the matter, is that naso-pharyngeal catarrh is undoubtedly, in many cases, due to a diseased condition of this so-called bursa pharyngea, but my own clinical studies go to show that we have, in addition to this, a catarrhal disease, which gives rise to a secretion, whose source is in the whole pharyngeal tonsil, viz., that mass of glands which is found normally distributed over the larger portion of the posterior and upper wall of the naso-pharynx. It seems to me entirely too narrow a view of the case, to say that all cases of naso-pharyngeal catarrh are dependent on the existence of a bursal cavity. Wherever we have muciparous glands gathered together in large masses, we have an anatomical condition which predisposes the part to a chronic inflammatory disease, in which the prominent lesion consists in cell desquamation, in connection with an apparent increased mucous secretion. This we find in the early stages of atrophic rhinitis, namely in the purulent rhinitis of children. We also find it, to a certain extent, in chronic inflammation of the faucial tonsils, and I think we are bound to accept the view, that we may also have the same morbid condition existing in the glandular structures of the pharyngeal vault. A chronic inflammatory process involving these glands, and attended with a moderate amount of diffuse hyperplasia, may result, then, in a muco-purulent discharge from the broad evenly distributed cushion of glandular structure, spread over the pharyngeal vault, or the hyperplasia may take such a form, as that the lateral lobes of the pharyngeal tonsil may be crowded toward the central line, and the superficial layer of epithelium of the one side of the central fissure, or recessus pharyngeus medius, may become united with the superficial layer of the opposite side, in such a way as to give rise to the bursa-like cavity of Luschka or Tornwaldt, after the manner first suggested by Schwabach,<sup>1</sup> the formation of the bursa being a somewhat adventitious incident of the morbid changes which take place in the

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<sup>1</sup> Loc. cit.



tissue, as the result of the inflammatory process, thus adding an entirely new condition, which serves to prolong, and possibly aggravate the catarrhal affection.

ETIOLOGY.—All chronic inflammation, involving glandular structures, develops in two distinct directions. It may result in a rapid cell development, in which the newly proliferated cells become part of the membrane, thus giving rise to true hypertrophy, or the cell proliferation may take on such extreme activity, as that the newly developed cells are thrown off, in connection with an excessive discharge of mucus, thus giving rise to a muco-purulent discharge. Now, as we know, inflammatory changes in the mucous membranes of young people show a marked tendency to invade the lymphatic structures, while in adults, it is the connective-tissue structures which are more especially involved. Following this rule, I think we must look for the primary source of the naso-pharyngeal disease to the earlier period of life. Now, in the majority of instances, an inflammatory process in children, involving the pharyngeal vault, gives rise to an hypertrophy of the pharyngeal tonsil, or so-called adenoid disease. Hence, it is altogether possible, that, in many cases, an enlarged pharyngeal tonsil in childhood, leads to the development, in adult life, of one of the forms of naso-pharyngeal catarrh heretofore described, which, as it undergoes the atrophic changes which occur at puberty, takes on a desquamative process, and so develops into a muco-purulent discharge from the naso-pharynx, or the muco-purulent catarrh may set in, without the existence of a pre-existing hypertrophy. In these cases, we undoubtedly find an active exciting cause, in some one of the exanthems, especially scarlet fever or measles. After its onset, I think the disease should be regarded in all cases as a purely local condition, and not dependent on any general dyscrasia, although Beverley Robinson<sup>1</sup> lays special emphasis on the fact, that the disease is due, not only to a catarrhal diathesis, but may be, and frequently is attached to the "gouty, hepatic, syphilitic, scrofulous and tubercular diatheses, and a malarial influence may likewise be evident," a statement which he repeats in the second edition of his work;<sup>2</sup> while Moure<sup>3</sup> also gives the first place to the strumous diathesis, as the cause of the disease. Lennox Browne,<sup>4</sup> on the other hand, while making the statement in his first edition, that patients suffering from naso-pharyngeal catarrh are generally scrofulous,

<sup>1</sup> "Nasal Catarrh," New York, 1880, p. 145.

<sup>2</sup> "Nasal Catarrh," New York, 1885, p. 140.

<sup>3</sup> "Manuel Pratique des Mal. des Fosses Nasales," etc., Paris, 1886, p. 256.

<sup>4</sup> "The Throat and its Diseases," London, 1878, p. 163.

seems to have abandoned this view entirely in his second edition.<sup>1</sup> I doubt the influence of atmospheric conditions in directly causing the disease, although they undoubtedly have a marked influence on the character of the symptoms.

As regards taking cold, I am disposed to think, that, in most instances, the chronic inflammatory process exists first, and that this renders the patient susceptible to atmospheric changes, with the result of his taking cold, and that repeated colds become a symptom of the chronic inflammation, rather than that chronic inflammation results from the repeated colds.

The use of tobacco, it is claimed, may be the source of a pharyngeal catarrh, a statement which is based, I think, on no very careful clinical observation. The offending element in the use of tobacco is the nicotine, whose action is on the nervous system, while the direct action of the fumes of the tobacco smoke is merely to cause a temporary irritation of the mucous membrane. Hence, I think, we may safely state, that the effect of tobacco-smoke is to temporarily, and perhaps permanently, aggravate an existing catarrhal lesion, while its causative influence in the primary production of the inflammatory process in the naso-pharynx is very limited.

The use of alcohol, on the other hand, is undoubtedly a prolific source of naso-pharyngeal catarrh, owing partially, perhaps, to the direct local action of alcohol upon the pharynx, but mainly, I take it, to the fact that there is a very close and intimate relation between the pharynx and the stomach, and that the chronic gastritis which so frequently results from the use of alcohol, gives rise to a sympathetic inflammation of the pharyngeal mucous membrane.

The possibility of contagion causing a catarrhal inflammation of the nasal cavities proper, has been the subject of no little discussion. I believe Beverly Robinson<sup>2</sup> is quite alone in the suggestion, that a person possessing the favorable constitutional diathesis, may contract the disease by contagion—a view which, I think, demands for its acceptance larger clinical evidence of its correctness than we at present possess.

By far the most frequent and most potent of all causes which lead to the development of a naso-pharyngeal catarrh, is a diseased condition of the mucous membrane lining the nasal passages proper. In the chapter on the physiology of the nose, the intricate and exceedingly important respiratory function of the turbinated bodies was discussed at considerable length, and an important feature of that discussion consisted in the assertion that the integrity of the mucous membrane of the whole upper air-tract was directly de-

<sup>1</sup> "The Throat and its Diseases," London, 1887.

<sup>2</sup> *Op. cit.*, 2d ed., p. 135.

pendent upon a healthy condition of the respiratory function of the nasal mucous membrane. If then, we have a chronic inflammation, with hypertrophy of the nasal membrane, interfering with the normal nasal respiration, and hampering the normal process of serous exosmosis, the very first portion of the respiratory tract beyond the nasal cavities, would be necessarily immediately subjected to the deleterious influence of this impaired function. And this, I think, is shown by clinical observation, in that, as a direct result of hypertrophic rhinitis, we have the normal function of the pharyngeal tonsil notably interfered with, and furthermore, its glandular structures subjected to the constant irritation arising thereby. As the result of this, the normal secretion of mucus is interfered with, cell desquamation stimulated, and the normal mucus, which as we have shown, is clear, white and easily fluid, becomes changed into a thick inspissated mucus, largely surcharged with unripe epithelial cells, and, in fact, becomes transformed into a muco-purulent discharge, which adhering to, and clinging upon its surface, hangs down between the palate and pharyngeal wall in thick masses of stringy mucus, which are expelled with great difficulty. I think it probable that in many cases the amount of the secretion from the pharyngeal vault in this disease, instead of being increased, is to an extent decreased. In other words, while in health, we have a very large amount of white transparent mucus poured out, of which the patient is unconscious, and which passes down into the pharynx for lubricating the bolus of food in deglutition, in disease, this secretion is much diminished in amount, and lodging in the cavity, is expelled with difficulty. Especially is this the case, where the affection is due to disease of the nasal cavity proper, for if the air, passing through the nasal cavities, does not become saturated with moisture in that passage, it reaches the pharyngeal vault in an abnormally dry condition, and therefore robs the mucus found in this cavity of a portion of its watery constituents, thereby rendering it thick and inspissated. And herein, it seems to me, lies one very important feature of the influence of a diseased condition of the nasal cavity, in giving rise to a nasopharyngeal catarrh. In atrophic rhinitis we have a condition of the nasal mucous membrane, in which the venous sinuses, in which the serous exosmosis has its source, are more or less completely obliterated, resulting in an abnormally dry condition of the nasal mucous membrane, and in which its surface is usually covered with dry greenish crusts. The inspired air, in passing through a nasal cavity in this condition, does not become surcharged with moisture, and hence, reaching the pharyngeal vault in this abnormally dry state, it exerts exactly the same influence as that already de-



scribed above, in connection with hypertrophic rhinitis, only its influence is more marked and more direct.

The condition of the naso-pharynx, in this disease, is one in which this cavity is filled and blocked with large masses of thick and inspissated mucus, and even may be abnormally dry, giving rise even to dry crusts. This condition is usually described under the designation of atrophic, or dry pharyngitis. I am certainly of the opinion, that in the very large majority of instances, this dry pharyngitis is nothing more than a abnormally dry condition of the normal pharynx, rendered so, as the result of the air passing through a nasal cavity, in which the respiratory function has been abolished by the atrophic process. In other words, pharyngitis sicca is purely a symptomatic disease, and a variety of naso-pharyngeal catarrh. The truth of this is shown in a striking manner, in those cases of atrophic rhinitis in which, as the result of constant douching, the atrophic condition is relieved, and the serous exudation so far stimulated and encouraged as to keep the membrane in a fairly moist condition.

**PATHOLOGY.**—The essential pathological lesion which constitutes a naso-pharyngeal catarrh, whether it is due to a diffuse hyperplasia and cell desquamation, involving the whole of the pharyngeal tonsil, or whether it may be due to the adventitious formation of Tornwaldt's bursa, has already been sufficiently indicated, by the discussion in the early part of the chapter. It need only be added that, in those cases where the bursa has been formed, the superficial epithelial layer of the gland structures becomes now, in the latter form of the disease, the lining epithelium of a partially closed cavity, the result of which is necessarily to stimulate them to still more active desquamation and secretion. As we know, where mucus is secreted in a closed cavity, or a cavity whose walls are in contact, the secretion becomes a pus secretion, and the mere presence of the pus, constantly bathing the cyst walls, stimulates them to still greater activity, and freer secretion. As we have already suggested, the primary morbid lesion is identical in both forms of the disease, the formation of the bursa being simply an adventitious incident of the inflammatory process. We now see, how this formation of the bursa results in a very notable increase of the pus secretion. On the other hand, however, it must be remembered, that in those cases where a bursa is formed, it results in a folding in, as it were, of the outlying glandular structures to the median line, the outlying furrows of the pharyngeal tonsil disappearing. Hence, the amount of secretion in Tornwaldt's disease is not necessarily greater, and probably is, as a rule, much less than in the diffuse form of the disease, for in Tornwaldt's dis-

case, the source of the discharge is from this small adventitious cavity, while in the diffuse form, the secreting surface involves the whole posterior wall of the naso-pharynx, extending from one Eustachian tube to the other. Moure<sup>2</sup> is responsible for the assertion, that where the pus discharge is very profuse, its source may be in a suppurative inflammation of the mucous membrane lining the sphenoidal sinus. The existence of such a complication would manifest itself by symptoms rather more pronounced than a mere naso-pharyngeal catarrh. As the result of the more or less complete closure of the orifice of the bursa, we have, in a certain proportion of cases, the formation of a retention cyst, a condition which Tornwaldt<sup>2</sup> found in forty-five out of two hundred and two cases<sup>3</sup> of bursal disease. Similar cases have been reported by Zahn,<sup>4</sup> Troeltsch<sup>5</sup> and Czermak.<sup>6</sup> I regard it as a somewhat suggestive commentary on the ordinary correctness of our clinical observations, that Tornwaldt should assert with a considerable degree of positiveness, that Störk's case of sphenoidal disease<sup>7</sup> already referred to in the chapter on that subject, was really a case of disease of the pharyngeal bursa—a view which would seem to be confirmed by the suggestion of Beverley Robinson,<sup>8</sup> that the mucous membrane of the accessory sinuses is so very scantily supplied with glands, that it could scarcely be the source of a very profuse purulent secretion.

I have removed, by mean of the curette and snare, small masses of the diseased tissue in the diffuse form of the disease in a number of instances, the microscopic character of which is fairly well shown in the accompanying cut (Fig. 123). In all cases, it need scarcely be stated, the patients from whom this tissue was removed were adults. The pathological conditions observed were as follows: The hyperplasia was characterized by the bulging of the mucosa, which assumed the form of small raspberry like projections, which gave the vault of the pharynx a somewhat mammillated contour. Under the microscope this feature is evidenced by the presence of globular protrusions between which there are furrows of varying depths (see Fig. 123 K). The lymph tissue is richly supplied with blood-vessels, and a rather dense fibrous connective tissue, the latter holding clusters of lymph corpuscles. The lymph follicles

<sup>2</sup> Op. cit., p. 259.

<sup>3</sup> Op. cit., p. 70.

<sup>3</sup> Op. cit., p. 70.

<sup>4</sup> Deut. Zeitschr. für Chir., xxii., pp. 392-399.

<sup>5</sup> "Lehrb. Ohrenheilkunde," 1877, p. 321.

<sup>6</sup> "Der Kehlkopfspegel und seine Verwerthung," etc., Leipz., 1863.

<sup>7</sup> "Klinik der Krankheiten des Kehlkopfes, der Nase und des Rachens," Stuttgart, 1880.

<sup>8</sup> Op. cit., p. 123.

are scarce and small. The accompanying figure (Fig. 123) shows two of these follicles, one on either side of the furrow. In none of the specimens examined was the presence of acinous glands demonstrable. In this feature, therefore, the tissue differs essentially from ordinary glandular hyperplasia, in which both the lymph tissue and the acinous glands are augmented in number and size.

We are led to the conclusion, therefore, that the increased secretion in naso-pharyngeal catarrh has its source largely in the furrows or fissures above described, for as we know, epithelium situated in this manner is transformed into mucus much more readily, and with greater activity, than when it is located upon the

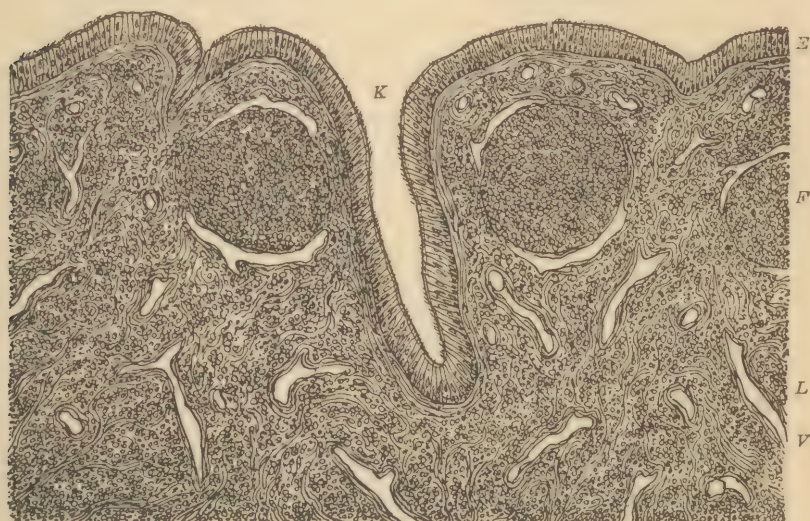


FIG. 123. —Lymphatic hyperplasia of the Pharyngeal Mucosa, illustrating the Morbid Changes in ordinary Naso-pharyngeal Catarrh. *E*, Columnar Ciliated Epithelium; *F*, Small poorly defined lymph follicles; *L*, Lymph Tissue intermixed with Fibrous Connective Tissue; *K*, Crypt on surface.

surface. Our greatest difficulty in understanding this somewhat curious disease naso-pharyngeal catarrh, lies in the attempt to harmonize clinical observation with the pathological changes revealed by the microscope, for while increased secretion is undoubtedly a prominent feature of the disease, the microscope fails to reveal the presence of those conditions usually associated with hypersecretion, namely an increase, or even the presence of acinous glands. We must conclude, therefore, that the increased secretion has its source in the fissures, or furrows, before alluded to, which present anatomical conditions not unlike ordinary mucous glands, and therefore take on a like functional activity. In addition to this I think we must recognize the fact, that this activity



is in no small degree stimulated by the presence of the lymphatic follicles, and the diffuse lymphatic hyperplasia, which act probably in much the same manner as the presence of a foreign body.

SYMPTOMATOLOGY.—The prominent symptom of the disease consists in the discharge from the vault of the pharynx, of a more or less profuse thick, yellow, muco-purulent discharge, which pouring out from the glands of the vault, makes its way down the pharyngeal wall and into the lower pharynx, or adhering closely to the membrane lining the vault, gives rise to more or less irritation, with a nasal screatus, and ineffectual attempts to dislodge it. Now, as before stated, the character of this secretion is, in most instances, due to the fact that the nasal cavity itself is diseased, and hence the secretion from the pharyngeal glands becomes thick and inspissated, as the result of abnormally dry air passing over it, and robbing it of its moisture. It is idle to suppose that the glands secrete a thick, tenacious, inspissated mucus in this state. No glands secrete other than a perfectly fluid mucus. This abnormal condition of thickness and inspissation is due to changes in the secretion after it is poured out from the glandular structures, and not to changes in the secreting organs. In many cases, the prominent subjective symptom of which the patients complain, is that of a constant "dropping" in the throat, the secretion being thinner and more nearly normal makes its way down and drops into the fauces. The density of the discharge varies greatly at different times and in different subjects. In some cases, it is almost a fluid pus. Especially is this true, if the source of the discharge is in a bursal cavity. When its source, however, is from the broadly diffused hyperplastic glands of the pharyngeal tonsil, it is a thick, yellow, grayish, tenacious mucus in all cases. The secretion is usually constant, day and night, yet while through the day its dislodgment is effected by voluntary motion, and perhaps flows more freely as the result of the normal movements of the fauces, during the night it accumulates in considerable quantities, with the result of imposing upon the patient a prolonged effort of hawking and nasal screatus, by which he attempts to dislodge the accumulated mass in the morning upon rising. Furthermore, this nocturnal accumulation not infrequently produces nausea and even vomiting, by its mere presence in the fauces. As evidence of the intimate connection between the pharynx and the stomach, and as lending weight to the view that the naso-pharynx belongs properly to the food tract, I have very frequently observed that patients suffering from a catarrhal affection of this region rise in the morning in comparative comfort, but immediately upon taking breakfast, and afterward, there seems to be excited thereby a profuse muco-

purulent secretion from the naso-pharyngeal glands, which persists oftentimes for several hours, apparently while digestion is going on.

As is usual, in all cases of a chronic inflammatory process in the upper air-passages, its progress is marked by more or less frequently repeated attacks of subacute inflammation, as the result of slight exposure to cold, during which the symptoms are markedly aggravated for the time. Moreover, we find the disease noticeably subject to changes in the weather, all the symptoms being worse in the fall and spring months, while the summer months give more or less complete relief. Place of residence, also, has a marked influence on the symptoms, in that residence in a dry and equable climate affords relief; while in a damp climate, especially near the salt water, the symptoms are notably aggravated.

It is usually stated, that the larynx and the air-passages beyond, are the seat of a mild chronic inflammation, owing to the fact that the secretions make their way down the pharynx, and pass into the larynx, causing local irritation and inflammatory changes there. I do not suppose that the secretion from the nasal passages or the pharynx ever makes its way into the laryngeal cavity under any circumstances. All extraneous matter passing through the pharynx is taken into the stomach, by an involuntary action, which is usually beyond the control of the patient. Certainly the presence of mucus in the pharynx, if it does not excite involuntarily the act of deglutition, becomes such an annoyance to the patient, that he is constantly tempted to swallow the mass, in order to relieve the throat of its irritating influence. Hence, I do not believe that naso-pharyngeal catarrh gives rise to a laryngitis in this manner. Those cases of laryngitis and bronchitis, with the attendant cough, which occur in connection with a naso-pharyngeal catarrh, I believe to be the direct result of a morbid condition of the nasal passages, unless, perhaps, the disease of the naso-pharynx gives rise to so great obstruction to normal nasal respiration as to compel habitual mouth breathing, in which case, sooner or later, laryngeal and bronchial trouble will develop.

Inflammation of the lower pharynx, or an ordinary pharyngitis, is not a concomitant of naso-pharyngeal catarrh, although I think this is a view usually taken by most observers. I believe a simple pharyngitis to be a somewhat rare affection. It is too much our habit to examine the fauces of a patient, and observing the tonsil slightly red, congested, relaxed, or flabby perhaps, to at once make a diagnosis of pharyngitis without stopping to question ourselves as to the fact of there being absolute evidence of inflammatory action there. As before stated, the lower pharynx belongs essentially to the food tract, and not to the air tract. It is involved

sympathetically with gastric catarrh, but not, as a rule, with catarrhal disease of the air-passages. Tornwaldt<sup>1</sup> reports having observed five cases of asthma, all of which were cured by the incision, and subsequent treatment of cysts, which he found had developed in the pharyngeal vault. He makes the general statement, that the disease was a reflex symptom, dependent upon irritation of the glosso-pharyngeal, vagus, and trigeminus nerves. We have already discussed the causation of asthma, taking the ground that it may be due to any obstructive lesion in the upper air-passages. These cases of Tornwaldt's are certainly unique. My own experience, however, has taught me to regard asthma as more closely dependent upon some disturbance of the great respiratory function of the nasal passages. Tornwaldt goes still further, in making the statement that hyperæmia and hypertrophy of the nasal mucous membrane are dependent upon bursal disease, or rather, as he puts it, that they are coincident with bursal disease, and disappear on the removal of the disease in the naso-pharynx. In this view he is supported by the observations by Luc<sup>2</sup> and Broich.<sup>3</sup> I confess my entire inability to reconcile this statement, either with my own clinical observations, or with my knowledge of the physiological and pathological processes of the upper air-tract. I can only explain it to myself, by taking the view, that the nasal disorder was of an unusually mild type, and that the removal of a far more prominent source of distress to the patient, rendered the remaining nasal disorder a comparatively trivial symptom.

Ten cases are reported by Tornwaldt, in which headache was a prominent symptom, and relief obtained by treatment of the naso-pharyngeal trouble. This also we must accept as an interesting contribution to clinical medicine, as confirming the teaching first made prominent by Hack, that in every case of cephalalgia, a thorough inspection of the respiratory tract must be made in order to detect any possible source of irritation or diseased action in that region. Whereas the relief of this distressing symptom is one of the most creditable of our successes in throat practice, there is no special symptom, in any given case of headache, which warrants us in the positive assertion that it is dependent on disease of the air-passages, and yet this distressing disease is relieved, in a large proportion of cases, by treatment directed to this region.

It is still a very prevalent impression among otologists and others, that catarrhal disease of the middle ear is very frequently due to a morbid condition involving the naso-pharynx. Tornwaldt, in his monograph, indorses this view. Now, while it is an undoubted fact that hypertrophy of the pharyngeal tonsil is the cause of ear

<sup>1</sup> Op. cit., p. 49.

<sup>2</sup> Loc. cit.



troubles in young children, in the very large majority of cases I think that this is due mainly to the fact, that the pharyngeal space is very largely encroached upon, and its normal functions interfered with, by the mere mechanical pressure of the hypertrophied lymphatic tissue. In adult life, however, whether a naso-pharyngeal catarrh is due to Tornwaldt's bursa, or to a diffuse hypertrophy covering the space, this thickening encroaches so slightly upon the pharyngeal cavity, that its normal function is but little interfered with. I do not believe that a middle-ear catarrh is ever dependent on an extension of the catarrhal process from the pharyngeal vault, but is due, either to a diminution of normal atmospheric pressure in the naso-pharynx, and to interference with the renewal of air in the middle ear, or to interference with the circulation of blood by the mechanical presence of enlarged glands. Hence, I think it is exceedingly doubtful, whether we are justified in looking for the source of ear disease in adults, in the pharyngeal vault, when we consider how far more active, and absolutely direct in its action upon the auditory apparatus, is a diseased condition of the nasal cavities proper. A morbid condition of the nasal mucous membrane then, in adult life, is the more prolific source of ear disease, and not the glandular structures in the vault of the pharynx. That we not infrequently meet with impaired hearing in connection with naso-pharyngeal catarrh cannot be questioned. In these cases I think that we must look for the source of both the ear trouble and the catarrhal disease in a previously existing adenoid growth. In other words, I think that if we carefully investigate the clinical history of these cases, we shall find that the catarrhal trouble of adult life had its origin in an adenoid during youth, and that this was the original cause of the deafness, which being moderate in extent, had only become a notable infirmity later in life. Tornwaldt asserts that hyperæmia and hypertrophy of the nasal mucous membrane, and even a persistence of nasal polypi, may be the direct result of a naso-pharyngeal catarrh, a view in which he is sustained, to a certain degree, by Broich<sup>1</sup> and Luc.<sup>1</sup> This assertion I find it exceedingly difficult to harmonize in any way with my own clinical observations. That a nasal hyperæmia or hypertrophy may give rise to a naso-pharyngeal catarrh, has already been stated. That the converse is true as a general rule, I find difficult of rational explanation. The same must be said, also, in regard to Tornwaldt's assertion that gastric catarrh may be dependent upon naso-pharyngeal disease. As already suggested, there is a close and intimate relation between the lower pharynx and the stomach, under which a catarrhal condition of the lower pharynx may be depend-

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<sup>1</sup> Loc. cit.

ent upon a gastric catarrh. We undoubtedly meet with many cases, in which the presence of the thick tenacious mucus in the fauces gives rise to hawking and spitting, which may result in vomiting, but this does not constitute gastric catarrh, but is very simply explained by the fact, that the presence of the tenacious mucus, impinging upon the lower pharynx, acts as any foreign body, and vomiting is produced, much as we produce it artificially, by titillating the fauces with the finger. I am disposed, therefore, to say that Tornwaldt's proposition must be reversed, and that if there is any connection observed between the naso-pharynx and the stomach, the latter is the offending organ, and that the nasopharyngeal catarrh is dependent upon a morbid condition of the stomach rather than the reverse.

DIAGNOSIS.—The recognition of this disease is based partially on an examination of the pharyngeal vault by means of the rhinoscopic mirror, and in part by the exclusion of disease of the intra-nasal cavity, although in many instances we shall be compelled to depend largely on the subjective symptoms. I think, that in no case can we decide that the catarrhal symptoms are directly due to the morbid condition of the vault of the pharynx, until the element of intra-nasal disease has been entirely eliminated. An examination of the pharyngeal vault by means of the rhinoscopic mirror, ordinarily will reveal to us an unbroken continuity of smooth membrane, as we slowly change the angle of the mirror in order to bring successively into view the posterior wall of the pharynx and trace it up to the broad expansion of the septum anteriorly. If, however, in making this examination, we find this continuity interrupted, or, in other words, if instead of the smooth rounded dome-like cavity of the naso-pharynx, we find projecting into it from the posterior wall a glandular mass, of sufficient thickness to protrude itself into the line of vision, in such a way as to partially shut off the direct view of the vault of the pharynx, we recognize this as a morbid condition, characteristic of this disease. Tornwaldt insists, that for a thorough inspection of the pharyngeal vault, the palate should be drawn forward by means of the palate hook. This undoubtedly enables us to use a larger mirror, and thus obtain a better view, in that the cavity is more thoroughly flooded with light. I think, however, that unless the space between the posterior pharyngeal wall and the edge of the palate is very narrow, a little experience should enable us to recognize a diseased condition without this procedure, especially when we consider, that the palate retractor is only tolerated by a comparatively small proportion of patients. Tying up the palate, after the manner already described, is, I think, usually better tolerated even than is

the palate retractor, and unquestionably, for a thorough diagnosis in these cases, an inspection should be made by the aid of this procedure, or after the manner suggested by Tornwaldt. There are two conditions, as already suggested, which we may recognize in the pharyngeal vault: one, an enlargement of the pharyngeal bursa, and in the other, the broad diffuse hypertrophy. The latter has been already described. The bursa is easily recognized, as a rounded, almond-shaped projection in the median line, and about midway between the prominence of the atlas and the dome of the pharynx. The noticeable condition that is characteristic of both forms of naso-pharyngeal disease, is the large amount of thick inspissated muco-pus, which is found in this cavity. This may be seen, thoroughly well diffused over the whole of the posterior wall of the pharynx, in a thick, gray blanket, as it were, or we may find it hanging down from the upper portion of the glandular structures, in yellowish-gray strings, stretching from the roof to the soft palate below. Tornwaldt suggests, that in bursal disease dried crusts are found lying immediately upon the surface of the rounded projection of the bursa, and that upon detaching this, its removal will be followed by a small string of yellow muco-pus, which is drawn directly from the bursal orifice. This may be true, but it requires very nice manipulation and delicate observation to verify it. We find thus, that the diagnosis of this disease ordinarily should be easy, as based on the direct inspection. The symptoms, however, always should aid us very greatly, in that the dropping of mucus from the pharyngeal vault or its lodgment in thick, inspissated masses, between the palate and pharynx, is so characteristic of the disease as to render the diagnosis comparatively simple, even when based on subjective symptoms alone. The statement has already been made, with a considerable degree of positiveness, that hypertrophic rhinitis does not ordinarily give rise to an excessive discharge. In other words, that disease of the nasal cavities does not result in the formation and accumulation of mucus, either in the passages proper, or in the discharge which makes its way from the nose into the vault of the pharynx. Any excessive secretion of mucus or muco-pus in the vault of the pharynx has its source in the vault of the pharynx, and not in the nose. The same, I think, is true of atrophic rhinitis or ozæna, and nasal polypi. Syphilitic disease, resulting in ulceration and necrosis, may occasionally give rise to so profuse a discharge of pus, as that it may make its way into the pharyngeal vault, but in these cases the syphilitic diagnosis should be so simple that a mistake need scarcely ever be made. Disease of the accessory sinuses gives rise to a purulent discharge from the nose, which not infrequently makes its



way into the pharyngeal vault, especially where the patient is in the recumbent position, as during sleep, in which case the symptoms closely simulate those of the naso-pharyngeal disease. During waking hours, however, this pus discharge is largely voided through the anterior nares into the handkerchief, presenting the character of a bright-yellow fluid pus, not specially resembling the thick inspissated muco-pus of naso-pharyngeal disease, and moreover, a discharge from the accessory sinuses is attended with the characteristic fetid hydrogen odor, and odor is never present in any form of catarrhal disease of the naso-pharynx; and, moreover, a careful inspection of the nasal cavities should always reveal the immediate source of the pus discharge.

PROGNOSIS.—This disease involves no dangerous tendencies, and shows no very marked disposition to increase, although it is essentially a chronic affection, and moreover, shows no tendency whatever to a spontaneous cure. As already stated, it is not to be regarded as an efficient cause of laryngeal or bronchial disease, asthma, or deafness. Hence, I think the statement that we occasionally see made, that pulmonary disorders may have their starting point in a naso-pharyngeal catarrh, may be dismissed, as based on no well-grounded clinical observation. The prognosis, as regards a cure of these cases, must be based mainly on our special skill in removing the definite morbid lesion, which our examination shows us to be present. In the present state of our knowledge of disease of the upper air-passages, I think we are in perhaps the larger proportion of cases justified in assuring our patients of a complete relief from all the troublesome symptoms of the disease, and it is a serious reflection on our special skill, if we fail to justify the promise. At best, however, the disease is a somewhat obstinate one, and we must not expect the same brilliant results, which we so frequently obtain in the treatment of diseases of the nasal passages proper, for while in the latter region our therapeutic measures are followed so frequently with the most prompt and flattering results, in catarrh of the naso-pharynx the amelioration of symptoms is in most instances slow, and the cases oftentimes exceedingly discouraging. I am of the opinion that, in the very large majority of cases, the disease can be cured, provided the patients are willing to submit to the long-continued course of treatment often required.

TREATMENT.—The question of a systemic habit, acting as a predisposing or exciting cause of naso-pharyngeal catarrh, has already been discussed, and the view taken, that the disease was mainly of a local character. Hence, I am disposed to question the efficacy of internal medication, such as has been suggested by Bev-

erley Robinson,<sup>1</sup> Moure,<sup>2</sup> and others, although if the gouty or rheumatic habit is present in these cases, there can be no question that the cure of the disease will be markedly facilitated by the administration of gouty and rheumatic remedies, and yet my own clinical experience does not justify the claim that a cure can be accomplished by those measures alone. In this form of catarrhal disease, as in that involving the nasal passages proper, it scarcely need be stated, that general hygienic measures may be of the utmost importance, such as the regulation of the clothing, the habits of life, attention to the skin, bathing, and other general measures, such as have already been discussed in the chapter on taking cold. Robinson,<sup>3</sup> in a number of communications on this subject, has advocated, with a considerable degree of enthusiasm, the internal administration of cubebs, as possessing specific properties in the treatment of this disease. As I understand it, he does not positively state that it cures, but rather that it ameliorates the severity of the symptoms. Its action, I take it, is simply as a stimulant, by which a freer and, therefore, a more fluid secretion of mucus is excited from the glandular structures in the pharyngeal vault, which flowing with greater readiness, is expelled more easily from the fauces, and thus becomes a much less annoying source of distress to the patient. The use of alcohol undoubtedly aggravates an existing naso-pharyngeal catarrh, both by its directly irritating qualities on the pharynx, but more especially by its indirect action, in setting up a gastric disturbance which reacts somewhat unpleasantly upon the pharyngeal membrane. Hence, its use should be always interdicted. It has been the custom for many years, and largely as a matter of routine practice, I think, to forbid the use of tobacco in any form to patients suffering from catarrhal disease of the air-passages. I have always considered nicotine absorption to be the vicious factor in the use of tobacco, and that the nervous system mainly suffers from the use of the weed, in that the action of nicotine is probably altogether on this system alone. In addition to this, tobacco smoke contains a certain amount of ammoniacal vapor, and where there is wood-fibre present, as in poor grades of tobacco, and especially in cigarettes, a small quantity of pyroligneous acid. These substances are both, to an extent, irritating to mucous membranes. Hence, we frequently notice, that a patient suffering from naso-pharyngeal catarrh, is greatly inconvenienced, and his trouble even aggravated by smoking. In these cases, it is necessary that the habit should be abandoned. But the cases of catarrhal disease which are aggravated by smoking are the exception, rather than the rule, and I believe it is perfectly

<sup>1</sup> Op. cit., p. 139.<sup>2</sup> Op. cit., p. 261.<sup>3</sup> Op. cit., p. 142.

safe, when asked the question as to whether the use of tobacco is injurious, to say to those individuals, that their own experience must be the guide, and if they find that the use of tobacco is injurious, to stop it, otherwise, I even think that it is unwise to compel them to abandon a habit, which is a source of comfort and pleasure, and which, even in many cases, may be of decided benefit for its soothing influence upon the general system. The practice has come largely into vogue of late years, of treating catarrh at our prominent Spas, both in this country and abroad, by the internal administration of mineral waters, combined with their local application, by means of atomizers and douches. I have never seen any notable good results accomplished by these methods. Where a laxative is indicated, undoubtedly the use of a glass of mineral water is of advantage, taken internally, but I know of no particular waters which possess any special virtue in this direction. Robinson<sup>1</sup> and Moure<sup>2</sup> both claim, that those mineral waters which contain largely of sulphur, are of special advantage in the treatment of this disease. This idea is not a new one, as the practice has been in vogue for many years, apparently based on the idea that there is some analogy between the skin and mucous membranes, and that because sulphur waters are beneficial in cutaneous diseases, they should possess a certain virtue in catarrhal affections. I see no objection to their use, as most of our patients are benefited by the use of a mild alterative and laxative mineral water. Too great reliance, however, should not be placed on this method of treatment. In this, as in all forms of catarrhal disease, climatic influences are very marked, in that the symptoms largely disappear by a change of residence to a warm and dry climate, and moreover, they are markedly aggravated by the damp weather of spring and fall. This change of residence, however, affords only temporary relief, in that the symptoms all return, as soon as the patient is subjected again to the influence of cold and damp atmospheric conditions.

The radical cure of the disease depends, I think, altogether on certain local measures, applied directly to the seat of the disease. Astringent washes and douches, in this form of the disease, exert not only a palliative influence, but also exercise certain curative powers. The vault of the pharynx is coated with a thick, tenacious blanket, as it were, of muco-pus, which is very largely the source of the unpleasant symptoms which characterize the disease. If this be thoroughly removed, twice each day, it not only mitigates the symptoms, but serves in a marked way to improve the character of the discharge, and to medicate, to a certain extent, its apparent causes, and furthermore, it removes a source of irritation, and

<sup>1</sup> Op. cit., p. 141.

<sup>2</sup> Op. cit., p. 262.



seems to encourage a healthier action in the gland tissues. For this purpose, there may be used any lotion which possesses the action of dissolving mucus, and at the same time of controlling cell proliferation. For this purpose we may use one of the following.

℞ Acidi carbolici, . . . . . grs. iij.  
 Pot. chlorat., . . . . .  $\frac{3}{4}$  i.  
 Glycerini, . . . . .  $\frac{3}{4}$  i.  
 Aquæ, . . . . . ad  $\frac{3}{4}$  vi.

M.

℞ Acidi borici, . . . . . 3 iss.  
 Aquæ, . . . . .  $\frac{3}{4}$  vi.

M.

℞ Zinci sulpho-carb., . . . . . grs. iij.  
 Acidi salicylici, . . . . . 3 i.  
 Aquæ, . . . . .  $\frac{3}{4}$  vi.

M.

℞ Potass. permanganat., . . . . . 3 ss.  
 Aquæ, . . . . .  $\frac{3}{4}$  vi.

M.

℞ Aluminis aceto-tartar.,<sup>1</sup> . . . . .  $\frac{3}{4}$  i.  
 Aquæ, . . . . . ad  $\frac{3}{4}$  vi.

M.

The above drug may also be used pure in the form of a powder, and insufflated behind the palate. The pharyngeal vault is not sufficiently well reached through the nasal passages by means of atomizers, to thoroughly remove the mucus which lodges there. The ordinary nasal douche answers a fairly good purpose, although by far the best device for a thorough cleansing of the pharyngeal vault is the post-nasal syringe shown in Fig. 32. This, however, is not easily manipulated by the patient, and the formulæ above given, are designed to be used night and morning, by the patients themselves. Hence, they should be instructed to use the little device, shown in Fig. 34, which, after a little practice, is easily manipulated. This may be used with the simple bulb attached as shown in the figure, or the post-nasal tip may be attached to an ordinary Davidson or fountain syringe, as shown in Fig. 33. As will be noticed, these devices direct the lotions in quite a free stream, directly against the diseased part, thus thoroughly washing

<sup>1</sup> This is I believe a German proprietary medicine and is put up in this form, and also as Aluminium Aceto-glycerinatum. It seems to have obtained considerable notice in the treatment of naso-pharyngeal catarrh, and although I have used it in a number of cases with benefit, it is by no means a specific.

away the accumulated mucus, not only from the gland surface, but also from the interstices or fissures which divide the ridges or eminences which make up the pharyngeal tonsil.

In addition to the above plan of treatment, which adds greatly to the comfort of the patient, as before stated, still further and more radical measures are demanded at the hands of the surgeon, and these consist in the thorough destruction or eradication of the offending tissues. Many patients may object to radical measures by means of the cautery, or to surgical interference, and in these cases, a certain amount of reliance can be placed on the local application of strong drugs, stronger than those above enumerated. Hence, after thoroughly cleansing the part, in the manner before stated, there may be applied by means of a pledget of cotton attached to a bent probe, the officinal glycerole of tannin, or better still, the officinal or the compound tincture of iodine, the applications being repeated at intervals of from three days to a week. Or we may use a solution of nitrate of silver, twenty to thirty grains to the ounce. The acetic acid preparations seem to possess a special action on this form of hypertrophy, hence their use is often specially indicated, preference being given to the monochlor-acetic acid, in its undiluted form. Lactic acid, also, is worthy of trial, and may be used in a solution of thirty to sixty grains to the ounce.

In making these applications, it is necessary to avoid touching healthy parts, hence the palate should be controlled by means of the palate hook, or better still, it should be tied back, by means of a rubber cord, after the manner described on page 24. A very simple device by which this measure, which is often unpleasant to the patients, may be avoided, is to make use of a cotton pledget, twisted firmly on the end of a bent probe, the pledget being made sufficiently large to enable the operator to coat its posterior aspect only with the agent to be used. This can, by a quick manipulation, be carried to the pharyngeal vault and swept rapidly over the part, and then withdrawn, without the necessity of there being any injury done to the healthy tissues of the soft palate. A simple little instrument for making stronger applications still is shown in Fig. 124, which, as will be noticed, consists of a minute shallow cup, with its concave surface presenting posteriorly, mounted on a long steel wire, which plays in a curved tube, the distal end of which is enlarged sufficiently to enable the cup to be withdrawn entirely within its lumen. In this cup may be fused chromic acid preferably, or perhaps nitrate of silver, and this is carried to the vault of the pharynx, when the cup holding the caustic is protruded from the tube, by pressing upon a button at the proximal end of the tube, and after sweeping it over the part which it is desired to

medicate, the cup is withdrawn into the enlarged distal end of the tube, when the instrument is easily removed without injuring healthy parts.

The above simpler measures of local application involve a somewhat prolonged course of treatment, and one in which the ultimate success is not of a most satisfactory character. As before stated, the radical cure of the disease consists in the thorough destruction of the offending tissues. Where Tornwaldt's bursa is shown by examination to exist, probably the best device for its destruction, is in the measure advocated by Tornwaldt himself, which consists in the use of the galvano-cautery electrode. For this purpose, he uses a pointed platinum tip, which is to be inserted directly into



FIG. 124.—Author's Porte-Cautique for Pharyngeal Vault.

the opening of the bursa, the manipulation being accomplished with the aid of the rhinoscopic mirror in position. After the electrode is well inserted the current is closed, and the sinus is cut through and thus thoroughly opened, or else its cavity is destroyed by thorough cauterization. Tornwaldt claims, that if thoroughly done, one application is usually sufficient, although I think, in most cases, there will be required repeated applications, not only to destroy the sinus itself, but also to destroy the hypertrophied glandular structures, which go to make up the whole mass of its walls. I have always regarded the galvano-cautery as an exceedingly awkward device for accomplishing a comparatively simple result, in that it is cumbersome, fickle, and always treacherous. There can be no question, however, that in the treatment of naso-



pharyngeal catarrh it possesses advantages over any other device that we possess. The object here is the destruction of tissue, and this destruction must be accomplished with a certain degree of nicety. The galvano-cautery enables us to carry a very harmless and unirritating instrument to the diseased part with ease and facility, which, after it has reached the part which it is desired to cauterize, is converted into a powerful destructive agent, by simply closing the electric current. After it has done its work, the circuit is opened, and the instrument, being allowed to cool off, is changed again to a state of harmlessness, and thus withdrawn without involving healthy parts. In the destruction of Tornwaldt's bursa, as will be noticed, an exceedingly nice manipulation is necessary, according to Tornwaldt's method. This, however, should ordinarily be accomplished with ease and certainty, provided the palate is held well under control by means of rubber cords, or Fränkel's device of a combined tongue depressor and plate hook.

In a certain number of cases, Tornwaldt<sup>1</sup> injected the bursa with a ten-per-cent solution of nitrate of silver, making use of a small syringe with a long curved platinum tube, the end of which was inserted directly into the bursal orifice. In other cases, pure nitrate of silver was fused upon the end of a probe, and passed into the bursa, although his results were not as good as with the galvano-cautery electrode. Broich,<sup>2</sup> on the other hand, depended almost exclusively on the injection of nitrate of silver, abandoning the use of the galvano-cautery on account of the intense reaction which seemed to follow its use, in producing violent occipital and cervical pains. Where the orifice of the bursa cannot be seen, the electrode is simply to be forced directly through the wall, without reference to a normal opening, and the cavity opened up in its long diameter. This closed condition may be the result of morbid action, or there may be a congenital cyst, as in the case reported by Lehmann,<sup>3</sup> in which the cyst was extirpated by means of a pair of curved scissors. In those cases, in which the catarrh is dependent upon a broad, flat, diffuse thickening of the glandular structures in the pharyngeal vault, the indications for treatment are the destruction of the glandular tissue, and for this purpose, we resort to one of the measures already noticed, giving preference to the chromic acid, by means of the little instrument shown in Fig. 124. If these measures fail, however, we resort to the more powerful action of the galvano-cautery. In this, as in all measures, the part should be thoroughly cleansed first, by the use of the syringe, in order to remove all the adherent muco-pus, after which, the palate being

<sup>1</sup> Op. cit., p. 80 et seq.

<sup>2</sup> Loc. cit.

<sup>3</sup> Langenbeck's Arch., Bd. xxxvi., Heft 1.

held well under control by means of the retractors or cords, the electrode is passed well up to the upper border of the gland structures, somewhat to one side of the median line, when the circuit being closed, it is drawn down in a vertical line, to a point perhaps a quarter of an inch above the promontory of the atlas, after which, if the patient tolerates the manipulation, a second and parallel furrow may be made on the other side. The electrode to be used in this manipulation may be the ordinary knife-shaped electrode bent to the proper angle, or as better protecting the soft parts, there may be used the instrument shown in Fig. 128, in which, as will be seen, the tip is formed by a spiral wire, covered with a hood. Where the manipulation behind the palate is not feasible, the pharynx may be reached directly through the nose by the instrument shown in Fig. 125, in which the transverse wire across the end of the electrode constitutes the cauterizing part. This is easily tolerated, and serves an excellent purpose. It can be used on both sides at the same sitting, the cauterization being repeated at the end of a week. After the use of the galvano-cautery, the douche or spray should be again used, in order to cool the part, and con-



FIG. 125.—Electrode for the Naso-pharynx, to be manipulated through the Nasal Passages.

trol any tendency to inflammatory reaction. In addition to this, the patient himself should be directed to use the douche twice daily, after the manner already indicated, and report for treatment at the end of a week, when the same procedure may be repeated. As Broich discovered, the galvano-cautery, even in the pharyngeal vault, is not unattended with a deleterious effect, in the form of an intense inflammatory reaction with neuralgia, etc., hence its use must be resorted to with the greatest possible care. Furthermore, it is not easy to absolutely destroy living tissue rapidly by means of the electro-cautery, the treatment of these cases of broadly diffused thickening, therefore, is oftentimes obstinate. If this be the case, I think resort should immediately be had to the use of the curette, shown in Fig. 134. The palate being well retracted, the whole area of the pharyngeal vault may be thoroughly scraped, and the offending tissue removed at one sitting, although, as a rule, more than one will be required. The manipulation must be accomplished with a certain amount of rapidity, in that hemorrhage at the outset is rather profuse, although never persisting to the extent of being troublesome. The pharyngeal vault is not as easily anæsthetized by the use of cocaine as the membrane lining the nasal cavity, and yet no operation should be attempted in this region, without first

making a thorough application of a twenty-per-cent solution of this drug, allowing from five to eight minutes to elapse before operative procedure. This region is not particularly sensitive, and yet an operation here is attended with more or less pain. This however, is largely mitigated, although as before stated, not entirely controlled by the use of cocaine.



## CHAPTER XLII.

### HYPERTROPHY OF THE PHARYNGEAL TONSIL, OR ADENOID GROWTHS IN THE VAULT OF THE PHARYNX.

THIS term is used as more accurately describing that condition of glandular hypertrophy in the upper pharynx, which has usually been described under the term adenoid vegetations. It may be defined as a true hypertrophy of the normal lymphoid structures found in the pharyngeal vault, and whose existence has been recognized since the days of William Hunter. The diseased condition in this region was first described by Wilhelm Meyer,<sup>1</sup> of Copenhagen, whose classical paper on the subject was based on the study of one hundred and two cases which had been under his personal care, and which was so thoroughly exhaustive in all its features, clinical and other, that it leaves little to be said on the subject that has not already been well considered by Meyer. It should be stated, however, that Czermak<sup>2</sup> had recognized and described, with a considerable degree of accuracy, the same condition as early as 1860, although he failed to recognize its clinical importance. Following Meyer, there appeared important contributions on the same subject by Loewenberg,<sup>3</sup> J. O. Roe,<sup>4</sup> Bosworth,<sup>5</sup> B. Fränkel,<sup>6</sup> Chatellier,<sup>7</sup> Hooper,<sup>8</sup> and others, by which, while our clinical knowledge of the disease increased, the correctness of Meyer's original deductions were fully confirmed.

ETIOLOGY.—The disease is essentially one of child-life, developing in infancy, and probably not infrequently being congenital.

<sup>1</sup> "Adenoid Vegetations in the Naso-pharyngeal Cavity," *Med. Chirurg. Trans.*, vol. liii., p. 191.

<sup>2</sup> "Du Laryngoscope," etc., French ed., 1860.

<sup>3</sup> "Tumeurs Adenoides du Pharynx Nasal," Paris, 1879.

<sup>4</sup> "Adenoid Growths in the Vault of the Pharynx," *Med. Record*, September 13th, 1879.

<sup>5</sup> "Adenoma of the Naso-pharynx," *Journal of Otology*, Jan., 1882; and, "Growths in the Nasal Passages," *Med. Record*, Jan. 13th, 1883.

<sup>6</sup> "Ueber adenoid Vegetationen," *Deutsche Med. Wochenschrift*, No. 41, 1884. (Pages in references refer to *Separat-Abdruck*.)

<sup>7</sup> "Des Tumeurs Adenoides du Pharynx Nasal," Paris, 1886.

<sup>8</sup> *Boston Med. and Surg. Journal*, March 15th, 1888.

Like other glandular hypertrophies, these growths show a tendency to apparently disappear at puberty. This may be explained by a diminution in the morbid activity of the tissues and a certain amount of shrinking which occurs in this peculiar form of growth at this age, and also by the fact that they occupy a relatively smaller space in the now more widely-developed pharyngeal vault. Meyer,<sup>1</sup> in an analysis of his cases, showed that they occurred at the following ages:

Under 5 years,	.	.	.	.	.	.	3 cases.
Between 5 and 10,	.	.	.	.	.	.	34 "
" 10 " 15,	.	.	.	.	.	.	25 "
" 15 " 20,	.	.	.	.	.	.	21 "
" 20 " 25,	.	.	.	.	.	.	11 "
" 25 " 30,	.	.	.	.	.	.	1 "
" 30 " 35,	.	.	.	.	.	.	4 "
" 35 " 40,	.	.	.	.	.	.	1 "
" 40 " 45,	.	.	.	.	.	.	2 "
Total,	.	.	.	.	.	.	102 "

An analysis of my own cases shows a somewhat different result as follows: Of 75 cases there were,

Under the age of 10 years,	.	.	.	.	.	.	5 cases.
Between 10 and 15,	.	.	.	.	.	.	16 "
" 15 " 20,	.	.	.	.	.	.	27 "
" 20 " 30,	.	.	.	.	.	.	23 "
" 30 " 40,	.	.	.	.	.	.	2 "
" 40 " 50,	.	.	.	.	.	.	1 "
Above the age of 50,	.	.	.	.	.	.	1 "
Total,	.	.	.	.	.	.	75

It will be noticed, that the average age of Meyer's cases is much less than my own. This difference is to be explained, in that I believe that in many instances the small glandular hypertrophies found in adult life, are identical with those of child-life, and are to be treated on the same principles. I have, therefore, included in my tables a larger number of those broad flat growths, which constitute the essential morbid condition of many cases of so-called naso-pharyngeal catarrh. The predisposing cause of the disease lies in that general predisposition, by which in young children a morbid process develops and has its highest activity in the epithelial and lymphatic structures, which disappears at puberty, and changes to a tendency to activity in connective-tissue structures,

<sup>1</sup> Loc. cit.

as is more fully described in the chapter on purulent rhinitis. The question arises here, how far any general dyscrasia, such as scrofula, syphilis, or tuberculosis may predispose to this disease.

Löwenberg<sup>1</sup> states that the lymphatic temperament is the "cause of the disease in the very large majority of the cases which he has seen;" while Potain<sup>2</sup> states that this tendency to the involvement of the lymphatics in morbid processes, characteristic of child-life, or lymphatisme as he calls it, is but a normal condition, which, carried one step further, gives us the true pathological condition of scrofula. Löwenberg, therefore, apparently leans to the view of a scrofulous taint in these cases, while Meyer and all subsequent writers reject this theory. The cause of these growths, then, is simply a tendency to hypertrophy, as the result of inflammatory changes, which characterize the lining membrane of the upper air-passages and their appendages under the stimulus of repeated colds, as formerly stated by myself.<sup>3</sup> It occurs in children more frequently than in adults, for the same reason that all glandular structures in children are more prone to take on morbid changes. The local inflammatory changes in the region of the fauces which accompany eruptive fevers in children, not infrequently prove a starting point of changes which result in hypertrophy of the pharyngeal tonsil, or stimulate into a renewed activity an already existing growth in this region.

Heredity has an undoubted influence, as we not infrequently see a number of children in the same family affected similarly, as noted by most observers. The publication of Meyer's paper gave rise to the suggestion, that the disease was peculiar to northern climates. Further study, however, shows us that it prevails to quite as great an extent in temperate regions.

Meyer<sup>4</sup> reported, that out of his 102 cases, 52 were males and 50 females, but further observed, that after 15, the larger proportion were females. Of my own cases, 49 were females, and 26 males, but my tables show the average age of my cases much older than those of Meyer, 21 being under 15, and 54 above that age.

Of the large proportion of cases in which I have seen it occur, less than half showed any morbid condition in any portion of the nasal passages. A frequent condition with which it is associated, is hypertrophic rhinitis. In ten of my seventy-five cases, it was associated with marked enlargement of the faucial tonsils, while in a much larger proportion, there was moderate enlargement of these glands. In four cases, it was met with in connection with atrophic rhinitis, three of these having reached the stage of ozæna.

<sup>1</sup> Op. cit., p. 12.

<sup>2</sup> "Dict. Encyclop.," Art. Lymphatique.

<sup>3</sup> "Growths in the Nasal Passages," Med. Record, Jan. 13th, 1883.

<sup>4</sup> Loc. cit.



**PATHOLOGY.**—A microscopical examination of the pharyngeal tonsil shows its construction to be as follows (see Fig. 126):

First, it is covered by a layer of columnar ciliated epithelium which exhibits the features of stratified columnar epithelium. The single columnar cells greatly vary in height, and exhibit sometimes long, sometimes short, bent ciliæ. Between the elongated feet of the epithelial cells irregular corpuscles of varying shape are visible, such as occur throughout the mucous layer of the aërial passages, the larynx, the trachea, and the bronchi. Only in one specimen was one side of the tumor covered by a narrow layer of stratified epithelium, probably corresponding to the medial aspect of the

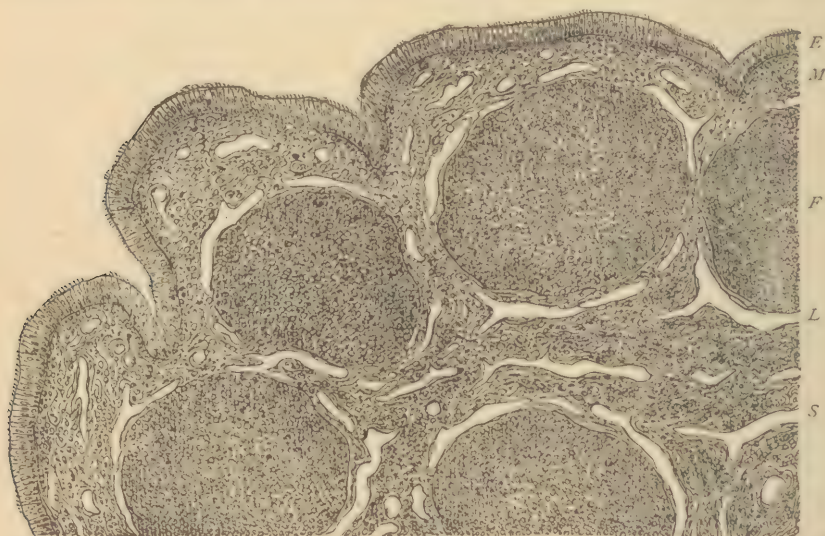


FIG. 126.—Hyperplasia of Pharyngeal Tonsil or Adenoid Disease of the Vault of the Pharynx. *E*, Columnar ciliated epithelium; *M*, myxomatous mucosa crowded with lymph corpuscles; *F*, lymph follicle; *L*, lymph vessel; *S*, inter-follicular tracts.

tumor, without cilia, with a gradual transition into columnar epithelium.

Second, all the tumors exhibit a lobate appearance, the fissure between the lobes being sometimes shallow and at other times very deep, dividing the whole mass into a number of longitudinal ridges. Each ridge may again exhibit a varying number of shallow papillary protrusions. Under the microscope correspondingly we observe large protrusions, which are caused by the follicular formation of the tissue, and small ridges of a papillary aspect caused by narrow protrusions of the subjacent tissue.

Third, the main mass of the tumors is composed of lymph tissue, formerly termed adenoid tissue, from the mistaken idea that this

tissue is glandular in nature. No epithelial formations enter, however, the structure of the tumor, save the depressions and furrows between the lobes, sometimes penetrating very deeply into the mass of the tissue, and there producing manifold secondary convolutions. Beneath the epithelial cover there is no fibrous connective tissue around the lobes, while the papillary elevations are produced by a delicate fibrous connective tissue freely supplied with lymph corpuscles.

According to the general structure of lymph follicles and lymph ganglia, we find in the tumors under consideration a varying number of lymph follicles, consisting of an accumulation of lymph corpuscles, and supplied with a comparatively small number of blood-vessels. The follicles are separated from each other and inclosed by what is known as inter-follicular strings. In these both a myxomatous reticulum and the fibrous variety of the connective tissue is more developed than in the follicles, and the blood-vessels are somewhat more numerous. Only in one of the specimens was there a marked fibrous inter-follicular tissue with comparatively few lymph corpuscles. In all others the fibrous connective tissue was but little developed, which feature would account for the comparative softness of these new formations.

With high power of the microscope in all specimens, the features common to lymph tissue are discernible. There is a myxomatous reticulum ill-defined and crowded with lymph corpuscles, in the meshes within the follicles. There is a more developed myxomatous or fibrous reticulum, with comparatively less lymph corpuscles in its meshes, within the inter-follicular strings.

In one case, a cyst was observed in the tissue near the surface, just perceptible to the naked eye, the size of a small pin's head. This cyst was lined on one side by flattened epithelium, on which even ciliae were still recognizable, while the opposite side lacked an epithelial cover, but was composed of lymph corpuscles, in connection with a delicate myxomatous tissue, filling in part the cyst. This latter feature indicated that the cyst had not arisen simply from an obstruction of an interlobular fissure, but was due to a transformation of the epithelial cover, at least on one side, into a medullary, and from this into a myxomatous tissue.

The examination proves the formations under consideration are no tumors, in the proper sense of the word, but a hyperplasia of the lymph tissue, which constitutes the so-called pharyngeal tonsil.

A difference between hyperplastic faucial tonsils and pharyngeal tonsils, is that, in the former, the fibrous connective tissue is, as a rule, far more developed than in the latter, which is usually accounted for by the fact, that while the latter lies in a region entirely

protected from the impact of food, or other matters, the former is constantly subjected to pressure and irritation from this cause, a process which necessarily gives a density and firmness to the faucial growth. In the main, however, the pathological lesion is identical in the two, being a true hypertrophy, and so warrants the use of the name tonsil, as applied to both. Now all writers regard the morbid process which results in this form of growth, as one of true hypertrophy, except Woakes. The mammillated appearance which the surface of these tumors often presents, however, has given rise to the statement on the part of Woakes<sup>1</sup> that the tissue may be of a papillomatous character. He divides these growths into two varieties, one being simply hypertrophy of the normal tissue found in this region, and the other he calls lymphoid papilloma. This view is further supported by the peculiar course which the blood-vessels take in their distribution through the growth, which Fränkel describes as fan-shaped. Fränkel further states, however, that the adenoid tissues preponderate to such an extent, that they should never be mistaken for papillomatous growths. Woakes, therefore, is quite alone in his view, all other observers regarding the growth as simple hypertrophy of the normal glandular structure.

In connection with the disease in the pharyngeal vault, we often find a chain of enlarged follicles, extending down on either side of the lower pharynx, immediately below the posterior pillars of the fauces, and also a large number of scattered follicles over the pharyngeal surface, in a state of enlargement, constituting a chronic follicular pharyngitis, or what is often called pharyngitis granulosa. Löwenberg<sup>2</sup> regards this as a primary stage of glandular enlargement in the pharynx, which extends to the tissues above, while Roe<sup>3</sup> makes the point, that while the disease of the lower pharynx is an hypertrophy of the normal glands, that in the pharyngeal vault is characterized by an involvement of all the normal elements of the mucous membrane, claiming a difference in the pathological processes of the two regions. We have already shown, that the diseased process in the upper pharynx involves mainly the lymphatic structures, while the connective-tissue element plays but a very small part in the process. Hence, I think, we may safely say, that the disease of the two regions is identical. Furthermore, my own observation goes to show that they develop together. Follicular pharyngitis is an exceedingly common affection in childhood, and I think we rarely meet with a case in which the glands of the vault of the pharynx are not notably involved.

**SYMPTOMATOLOGY.** The prominent and most troublesome symptom to which the presence of these growths gives rise, is an

<sup>1</sup> "Post-Nasal Catarrh," Phila., 1884, p. 163.

<sup>2</sup> Op. cit., p. 18

<sup>3</sup> Loc. cit.



excessive discharge of mucus or muco-pus. The source of the discharge is, undoubtedly, in the diseased glands themselves, their normal secretory function not being destroyed by the morbid process, which has given rise to the hypertrophy, but is, on the contrary, greatly increased, in the manner already discussed in connection with the pathology of naso-pharyngeal catarrh, the view being taken there that the crypts and fissures in the surface of the tissues constituted a secreting membrane closely resembling muciparous glands, and that the secretion was still further augmented and stimulated by the pressure, the hypertrophied lymphatic tissue acting somewhat in the manner of a foreign body. We find them, therefore, pouring out large quantities of mucus or muco-pus, which in the greater proportion of cases makes its way into the lower pharynx. In those cases in which the growth has attained a large size, the discharge makes its way through the nasal cavities proper, and is voided through the nostrils. It possesses the character of a thick, ropy, and tenacious mucus, which tends to accumulate in the nares, especially in young children, who find difficulty in expelling it, both from inexperience, and from the occlusion of the posterior nares by the overhanging pendulous growths.

Another symptom which may be traced directly to the existence of these growths, and perhaps the first to be noticed will be the altered character of the voice. This is changed into what Meyer calls the dead voice. It is the voice of one with a cold in the head, that is, the nasal twang is more or less completely abolished. In this way "m" and "n" become "eb" and "ed." In order to give rise to this, the growth need not be large. It may occlude but a small portion of the posterior nares. In order that the voice shall have its full nasal resonance, the vault of the pharynx should be quite clear. If but a small growth projects from its wall, it seriously interferes with the sound-waves, which in nasal sounds, should have a clear field from the vocal cords to the roof of the nares. If they impinge upon the slight projecting shoulder of a growth, located in the pharyngeal vault, they are to an extent smothered, and the whole tone of the voice deadened.

The manner in which the singing voice is affected by these growths in the pharyngeal vault, offers many points of great interest. Nature is very lavish in her endowment of the various organs of the body, by which their different functions are performed, and so supplies an organ capable of doing vastly more work than it is usually called upon to perform. The larynx when called upon for an ordinary voice, responds readily, and will supply apparently a clear, healthy, conversational voice for years, even when there may exist very marked morbid changes. Let the voice be taxed by a

prolonged and labored effort, as in a sermon or address, and the weakness soon makes itself felt. The singing voice taxes the very highest powers and capabilities of the larynx, and demands not only a healthy larynx, but a healthy condition of the whole upper air-tract. The recognition of this latter truth I believe to be of the utmost importance. The vocal waves are set in motion by the vibration of the vocal cords, the pitch of the tone is regulated by the tension of the cords, and here in the main, the function of the larynx ceases, unless we add, perhaps, quantity or loudness of voice. Those qualities of the voice which we call timbre, its character and resonance, are given it by the pharyngeal and nasal cavities. These should be entirely clear of any obstructing morbid condition, or changes in their lining.

In the lower or chest register, so-called, the nasal and pharyngeal cavities are of comparatively little importance. The voice depends largely on the larynx. In the middle register, a healthy pharynx is of importance, but in the head register, a healthy nasal and pharyngeal cavity are absolutely essential. The manner in which the singing voice soon breaks down under the action of a pharyngeal growth, is quite simple. As soon as a note in the upper register is attempted, the singer is conscious of something wanting, the tone is muffled, from the fact that the vocal waves striking upon the mass are suppressed, as it were, the sounding-board function of the pharynx being destroyed. The singer, therefore, in order to overcome this obstacle, attempts, though generally without success, to increase the power or volume of the voice. The larynx is taxed beyond its strength, and ruptured capillaries or ruptured muscular fibres result, and a chronic laryngitis is the consequence.

It is a very noticeable fact with singers, that it is the head register which becomes first impaired in a failing voice, and in many cases it is the head register alone which is weak, the middle and chest notes being taken with ease and in clear voice. This illustrates the truth of what I have for a long time urged in my teaching. The nasal passages are the first to become the seat of catarrhal disease, and the tendency is very marked for this to extend downward, and furthermore, that in the very large majority of instances, so-called chronic laryngitis is but a secondary condition, resulting from disease in the nasal cavities, the laryngitis being a symptom, as it were, of the disease in the parts above.

In Meyer's original paper, prominence was given to the occurrence of ear-symptoms in connection with adenoid disease. Probably no symptom of the disease possesses greater importance, or requires more thorough appreciation and study, than that of ear-complications, occurring, as they do, early in life, and at a time

when their prompt recognition only, may save the patient from permanent loss of this important faculty. The proportion of cases which escape ear-trouble is probably small. Woakes<sup>1</sup> goes so far as to state, that not more than five per cent of his cases escaped ear-complications, while Urbantschitsch,<sup>2</sup> out of one hundred and seventy-five cases of adenoid vegetations, found the hearing affected in one hundred and thirty. In Meyer's one hundred and two cases of glandular hypertrophy, seventy-two suffered from aural disease, while Swinburne<sup>3</sup> found ear-complications in twenty-seven cases out of forty-two cases observed of adenoid disease. In my own seventy-five cases, eight cases showed extreme deafness, and twenty moderately impaired hearing. Looking at the question from the reverse point of view, we find Swinburne<sup>4</sup> making the statement, that out of one hundred and seventy-nine cases of middle-ear disease, he found that twenty-seven had adenoid vegetations. These statistics embrace cases of all ages, and although I have no data to go on, other than the general result of observation, I think it safe to say, that if the adults were eliminated, we would find a still more striking connection between adenoid growths and aural disease. Looking at the question from both points of view, probably a very large majority of cases of ear-troubles in children under the age of twelve, are dependent upon vegetations in the pharyngeal vault, and furthermore, that while not adopting the rather startling statistics of Woakes, I think it safe to say, that a careful examination in children would reveal an even larger proportion of ear-complications than those already cited. The two aural conditions met with in adenoid disease are chronic catarrhal otitis, and chronic purulent otitis. The method of development of these two diseases I believe to be essentially the same. It is usually stated that ear-disease from the presence of adenoid growths in the pharyngeal vault is due to pressure on the Eustachian orifice. These growths are of a soft, pulpy consistency, while the eminences which surround the Eustachian orifice are hard and dense; hence, any pressure exerted upon them by an adenoid growth, would have but slight, if any effect. I think a far more plausible explanation of the symptoms, is in the interference with the renewal of air in the middle chamber, caused by their presence in the pharynx. Any cause which interferes with free nasal respiration, if continued sufficiently long, is liable to cause impaired hearing, by its interference with this function. The method in which this occurs, I take it, is that nasal stenosis, arresting the to-

<sup>1</sup> "Post-nasal Catarrh," Phila., 1884, p. 168.

<sup>2</sup> Cited by Chatellier, *op. cit.*, p. 51.

<sup>3</sup> New York Med. Record, Oct. 6th, 1883, p. 373.

<sup>4</sup> *Loc. cit.*



and-fro current of air though the nasal passages, causes a stagnation in the pharyngeal vault, and necessarily a certain amount of rarefaction of air in that region. Moreover, the free action of the levator palati muscles is interfered with by the presence of these growths, and this movement is of the utmost importance in accomplishing this mechanism of air renewal. In studying these parts by the rhinoscope, the impression is gained that the tendency of muscular movement here is to force air into the middle ear. The constant and almost ceaseless impulse of sound-waves upon the tympanum, must necessarily cause a rarefaction of air in the middle ear, and this loss is compensated for by the mechanism above alluded to.

As a result, then, of this interference with the normal respiration, rarefaction of air gives rise to a condition of hyperæmia of the mucous membrane extending through the Eustachian tube and middle ear. Now, this hyperæmia does not constitute inflammation. Inflammation, as I take it, is attended with hypersecretion. Hypersecretion is not always a feature of chronic catarrhal otitis media, so-called. The Eustachian orifice is closed, the air in the middle chamber rarefied, the drum-head retracted, and further changes in connection with the more intricate apparatus of the ear results in impairment of function. In a very large number of cases this process continues, leading to ankylosis of the ossicles, and atrophy of the tympanic membrane. In the smaller proportion of cases, arising in the same manner from nasal stenosis and rarefaction of air in the middle chamber, we have set up a true catarrhal inflammation with hypersecretion. Now, as an invariable law, where we have catarrhal inflammation setting up in a closed cavity, this process is converted into one of suppuration. This is true in the vagina, in the urethra, in the accessory sinuses of the nose, and in fact in all the mucous-lined cavities of the body. As the result we have a chronic suppurative otitis media. Why this occurs in one case and not in the other I have no suggestion to make. Woakes<sup>1</sup> suggests that the suppurative form is more frequently met with when the adenoid vegetations affect mainly the vault; on the other hand where the growths are fewer in number, and are situated on the posterior wall, the disease is more apt to assume the non-suppurative form. It should be stated, however, that the suppurative form of the disease may be developed from the non-suppurative in the following manner. After the chronic catarrhal inflammation has existed for a long time, the drum-membrane becomes excessively thin and atrophic. By some unknown cause, frequently without doubt mechanical, this membrane is perforated,

<sup>1</sup> Op. cit., p. 169.

and air admitted to the middle ear through the external canal, thus giving rise to a suppuration.

That the ear-symptoms are due to an extension of catarrhal inflammation to the Eustachian tube, as advocated by Fränkel, Woakes, Löwenberg, Beverley Robinson and others, I think is very questionable. Certainly it is very rare to find the lining membrane of the Eustachian orifice in a condition showing any evidence of catarrhal inflammation by rhinoscopic examination. Löwenberg<sup>1</sup> directly asserts, that the presence in the pharynx of an inflammation, which easily spreads to the middle ear, is the cause of the ear-symptoms, but inflammation is not necessarily an accompaniment of adenoid disease in the vault of the pharynx. Most writers attribute the ear-symptoms to mechanical obstruction, which is undoubtedly a very active contributing agent in their development, but not, I think, the most prominent one. Blake,<sup>2</sup> of Boston, advocates a very ingenious theory, that hyperæmia is set up in the middle ear, by interference with the return circulation, on account of the superficial pressure exercised on the pharyngeal veins by the morbid growth, and also on the veins coursing through the deep-seated tissues.

Nasal stenosis is quite a prominent symptom of the affection, and is present even in cases where the growth has not attained an unusual size. This may not be so noticeable during waking hours, but during sleep, when the voluntary muscles of respiration are not brought into play, it is more prominent, and the patient sleeps with the mouth open.

It is a very noticeable fact, that these growths show a marked change in size when examined at different periods, which would indicate simply, that under the influence of damp weather, or other causes, they are liable to become the seat of an active turgescence or distention of their blood-vessels, by which their size is temporarily increased. This occurrence, especially in children, is attended with an increase of secretion, with obstruction to nasal breathing; in fact, the child has apparently an ordinary cold in the head, attended with its usual symptoms. As already noted, we must bear in mind that an acute rhinitis is comparatively rarely met with in a child, and that in most instances, when a child has an apparent cold in the head, it is really suffering from a subacute inflammation of the pharyngeal tonsil. In other words, the clinical history of chronic inflammation or hypertrophy of the pharyngeal tonsil is marked, like inflammatory processes in other portions of the upper air-tract, by a liability to repeated attacks of acute inflammation.

<sup>1</sup> *Op. cit.*, p. 35.

<sup>2</sup> "Relation of Adenoid Growths in the Naso-Pharynx, to the Production of Middle-ear Disease in Children," *Boston Med. and Surg. Journal*, March 15th, 1888.

Cough is present in certain cases, especially if there is much secretion, which has made its way down the pharynx into the larynx, exciting a laryngitis. The cough, again, may be the result of the habitual mouth-breathing.

Headache is an occasional symptom, not perhaps occurring with the same frequency as it is met with in hypertrophic rhinitis. Fränkel<sup>1</sup> discusses this symptom somewhat at length, without, however, suggesting an explanation of it. It probably arises in much the same manner as do those cases which depend on disease of the nasal chambers.

Asthma, also, may be dependent on the existence of adenoid growths, as noted by Fränkel and Chatellier. One such case has come under my own observation, in which complete cure was obtained by the removal of the growth.

Epistaxis, of somewhat trivial character, occasionally occurs, or the child may on awakening in the morning, discover blood clots in the mouth, which have resulted from a slight hemorrhage during sleep.

Chatellier<sup>2</sup> mentions nightmare, as a symptom of the disease. This symptom is rather an accompaniment of enlarged tonsils, a disease in which it occurs quite frequently. I should be disposed to attribute it to the enlargement of the faucial tonsils, which so frequently accompanies the affection under discussion. Snoring, on the other hand, is almost always present in disease of the pharyngeal vault, due probably to a certain amount of relaxation or weakness of the palatal supports, which accompanies the disease. Fränkel<sup>3</sup> states that this symptom is not due to a vibration of the palate, but is produced by laryngeal obstruction, and gives an exceedingly curious explanation. He says, that during normal respiration, the lower jaw is held in position by atmospheric pressure; that the nasal passages being obstructed in these patients, the mouth falls open, and as a result of this, the base of the tongue falls backward upon the epiglottis, thereby obstructing the larynx, and giving rise to the symptom. This is ingenious, but affords a better explanation of the occurrence of nightmare, than of snoring. In very young children, the inability to nurse, as the result of nasal stenosis from this or any other cause, is well known. Spasm of the glottis, also, from nasal stenosis, in children of neurotic habit, may be a very troublesome symptom of the disease.

Both Hooper<sup>4</sup> and Chatellier<sup>5</sup> mention night-sweats as one of the symptoms of the disease. This symptom is present in a certain proportion of cases, but probably only in those in whom the health

<sup>1</sup> Loc. cit., p. 18.

<sup>2</sup> Op. cit., p. 28.

<sup>3</sup> Loc. cit., pp. 10, 11.

<sup>4</sup> Loc. cit.

<sup>5</sup> Op. cit., p. 28.



has become deteriorated, as the result of disturbed sleep and impaired nutrition.

Most writers allude to the chest deformity, which is said to accompany adenoid disease, and quote the very distressing case depicted by Dupuytren in his "*Mémoire sur la dépression laterale des parois de la poitrine*,"<sup>1</sup> of a child with enlarged tonsils, and that deformity of the chest which we call pigeon-breast, who fell, after violent and useless efforts to breathe, into a most alarming state of convulsions, etc. It is customary to quote the case with the comment that Dupuytren had here to deal with a case of adenoid disease. As already stated, children with adenoid disease enjoy fairly good general health. Certainly no such deformity as that described by Dupuytren could well be produced by enlarged faucial or pharyngeal tonsils, unless there already existed some previous systemic condition, such as rachitis or any general condition which might lead to that curious disease of the bones which we call *mollities ossium*.

Probably no symptom of adenoid disease is more striking or characteristic, than the peculiar facial appearance which these patients present. This symptom, however, as a rule, is most noticeable in children under the age of fifteen or sixteen years, but so notable is it in these young people, that probably in the majority of cases, a single glance at the patient will be sufficient for a correct diagnosis. This peculiar facial expression consists essentially in a broadening and flattening of the bridge and root of the nose. Now, add to this the open mouth, usually rendered necessary by the nasal stenosis, and you will give to the child a curiously vacant, semi-idiotic look, which is very striking (see Fig. 127). Now, Meyer attributes this to a sinking in of the nasal bridge, owing to disuse of the nasal passages. David<sup>2</sup> enters into a full discussion of this question, and states that, as a result of the disuse of the nose, the accessory sinuses, which in health perform certain functions, fall also into disuse, and therefore the bones of the face fail of full development. In this manner, the cheeks assume a flattened ap-



FIG. 127.—The Face of a Girl illustrating the Peculiar Facial Expression which is Characteristic of the Existence of an Hypertrophied Pharyngeal Tonsil. (Hooper.)

<sup>1</sup> *Répertoire Générale d'Anatomie et de Physiologie*, 1828, p. 110.

<sup>2</sup> Cited by Chatellier, *op. cit.*, p. 48.

pearance, the eyebrows are depressed, and indeed the whole facial contour is to an extent flattened, as it were, and presents a vapid and featureless expression. Fränkel<sup>1</sup> suggests an additional element of facial distortion, in that, as a result of the habitual mouth-breathing, the naso-labial fold is drawn downward and backward, and in extreme cases, the external angles of the eyes also sink downward. These conditions may possibly be present in cases of long standing, but I think, ordinarily, the essential feature of the facial expression lies at the root of the nose, in its broadened and flattened contour, by which there is apparently a widening of the distance between the two eyes. The idiotic expression is perhaps fanciful, for the mere opening of the mouth and depression of the jaw gives that, although the dull expression is undoubtedly enhanced by the impairment of hearing, which so frequently exists in these cases, for although writers allude to a certain dulness of intellect, which occurs in these patients, I do not think the observation is a correct one, this dulness being due to an apparent lack of attention, which partially deaf children show. Fränkel<sup>2</sup> discusses this question quite fully, and while denying that these patients are naturally dull of intellect, suggests that the habitual mouth-breathing, disturbed sleep, headaches, and impaired hearing, from which they suffer, produce a condition of apathy, which might be called dulness. Certainly, in my own experience, I have never been able to discover that these patients were not the possessors of the ordinary brightness and alertness of intellect, of children in ordinary health. That there is any morbid development of the facial bones, as suggested by David, becomes questionable, when we remember how rapidly all these conditions disappear, after the removal of the growths, as do also the other symptoms alluded to, such as mental apathy, inattention, etc. Where the growths are large, and nasal stenosis marked, the sense of smell is necessarily impaired, from the imperfect manner in which odorous particles reach the terminal filaments of the olfactory nerve. The sense of taste also is impaired, as is usually the case where the sense of smell is defective.

A somewhat unique symptom has been noted by Scanes Spicer,<sup>3</sup> who observes that in a certain proportion of cases of adenoid disease, the transverse nasal vein, which courses beneath the skin across the bridge of the nose, is dilated, and shows as a well-marked blue line. This, Spicer states, is due to pressure of the enlarged glands in the pharyngeal vault, on the tributary veins, as they pass through the palatine foramina, and disappears upon the extirpation of the growth.

<sup>1</sup> Loc. cit., p. 11.

<sup>2</sup> Loc. cit., p. 15.

<sup>3</sup> British Med. Journal, August 27th, 1887.

DIAGNOSIS.—The prominent symptoms of facial expression, dead voice, nasal stenosis, and catarrhal discharge, will ordinarily prove sufficient for a correct diagnosis. Examination, however, by the rhinoscopic mirror, gives always the additional information of the size of the growth. By anterior examination, nothing will be learned ordinarily, other than the absence of a diseased condition of the nasal cavity, to account for the trouble. If the passages, however, are clear, the growth in the pharynx may be frequently recognized by this examination, as stated by Fränkel<sup>1</sup> and Michel<sup>2</sup> although this is disputed by Roe.<sup>3</sup> By posterior rhinoscopy, with the tongue depressed, and the palate relaxed, a thorough inspection of the tumor may be secured, even in the smallest children, if care and patience are sufficiently exercised. Instead of the rounded dome-like cavity of the pharynx, there will be presented a rounded mass, of a reddish-gray tinge, with a mammillated surface, hanging down, as it were, and obstructing the view into the nasal cavities. I think the best test for the existence of an adenoid growth, is the ability to trace the continuity of the pharyngeal wall, by inclining the mirror slowly forward, in such a way as to bring into the field of vision progressively, the posterior wall of the pharynx, gradually passing over to the broad expanded upper portion of the nasal septum, and tracing its converging lines, until it reaches the palate. Now, if in this inspection we find the view of the upper portion of the nasal septum obstructed in a greater or less degree, we recognize the presence of a growth whose uniform contour and symmetrical appearance will indicate hypertrophy of the normal tissues, or an adenoid growth. In tracing the continuity of smooth surface, from the pharynx to the septum, we will find that even a comparatively small growth will interrupt the view, and shadow the broad upper portion of the nasal septum. The size of the growth will be estimated by the extent to which the nasal septum is veiled on inspection by the pendent growth. In most cases, the growth presents itself in vertical ridges, separated by fissures, presenting something of the appearance of the brain-surface. In other cases, we find a somewhat mammillated appearance, which has given rise to the mistaken idea advocated by Woakes, of the papillary character of the growths.

In adult life, the growth presents a smoother contour, the fissures having to an extent disappeared. The location of the growth does not, I think, vary greatly in different cases. It constitutes, in mild cases, a broad ridge extending across from one Eustachian tube to the other. If the tumor is of larger size, the centre of this ridge becomes enlarged and rounded, and projects further down-

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Loc. cit., p. 20.

"Krankheiten der Nasenhöhle."

<sup>3</sup> Loc. cit.



ward and forward toward the soft palate. Meyer<sup>1</sup> describes these growths as being found both in the fornix, or upper portion of the pharynx, and the posterior or lateral walls of the upper pharynx, and very rarely on the floor of the nares, where they form, as it were, a duplicature of the soft palate. He also describes hard round spots on the velum, which he considers of an identical nature. This glandular hypertrophy of the floor of the nares, or velum palati, however, I should regard as belonging to another category. As to the varying locality of growths in the pharynx, I should regard this distinction as based simply on observations of the same growths, which present merely variation as to their development or shape, just as we have variations in the extent and shape of the development of hypertrophy of the faucial tonsil.

The lower pharynx presents no distinctive appearances in these cases, although it is an almost invariable rule that we find here a condition of chronic follicular pharyngitis. There is also usually present more or less purulent secretion, whose source is in the diseased condition of the pharyngeal vault.

Lennox Browne<sup>2</sup> alludes to a symptom which is usually present where the faucial tonsil is not enlarged, which consists of a "peculiar narrowing, associated with thickening of the fauces, and a want of definition about the pillars." This symptom is not, however, present, except where the growth has attained considerable dimensions.

All observers recommend a digital exploration of the pharyngeal vault, as an additional aid to diagnosis. This is not a difficult manipulation, and is generally fairly tolerated by children, and yet I think is rarely necessary. Very little information is gained thereby which is not already obtained by the subjective symptoms and rhinoscopic examination; although, where rhinoscopy is impracticable, this should be always resorted to as giving us information not only of the presence of the growth, but also of its size and character. Lennox Browne<sup>3</sup> makes an excellent suggestion on the carrying out of this manipulation, which is, that when the finger has reached the pharynx, the lower portion of the septum should be first sought, and this traced up with the tip of the forefinger, until the growth is impinged upon, when the exploration of the right and left lateral walls may be completed. Hooper<sup>4</sup> makes the statement that in children the contraction of the muscles of the palate against the forefinger, may give the mistaken impression of a protruding growth. It is simply to be remembered that the growth is posterior, and does not present in front. The same may

<sup>1</sup> Loc. cit.

<sup>2</sup> "The Throat and its Diseases," London, 1887, p. 518.

<sup>3</sup> Op. cit., p. 519.

<sup>4</sup> Loc. cit.

be said of hypertrophy of the posterior extremity of the lower turbinated bone, which occasionally protrudes from the posterior nares.

Meyer mentions also two almost pathognomonic signs of adenoid disease: first, in practising inflation of the middle ear by the Eustachian catheter, the stream of air, after having passed freely into the tympanic cavity, will suddenly stop, and in a short time will flow on again as freely as before; second, a gurgling or bubbling sound of thick mucus, behind the nasal cavity, is heard during inflation, and sometimes bubbles of the same viscid mucus will appear at the nostril through which the catheter has been introduced. Both symptoms disappear after removal of the vegetations. I should scarcely attribute great diagnostic value to these symptoms, although undoubtedly present in many cases.

Schech<sup>1</sup> quoting Semon, advocates as an equivalent for digital examination of children, which is occasionally difficult and even painful, that the permeability of the naso-pharynx be tested by injecting a small quantity of warm water, by means of a ball syringe. If the water does not at once flow in a stream from the other nostril, but, on the contrary, escapes through the mouth, then it is certain that there is an obstruction in the naso-pharynx. This method is also recommended to prove whether or not an operation has restored the passage. This device is a most excellent one, and may well be resorted to before digital exploration is practised. A much better device, however, is in the use of fluid cosmoline or sweet oil, atomized by the instrument shown in Fig. 47. As we know, when this is atomized it forms a cloud, as it were, of the density of smoke. If this is sprayed into one nostril, where the nasal passages and naso-pharynx are clear, it will emerge from the opposite side in a stream whose force and direction are almost equal to that with which it escapes from the tip of the atomizer. If, on the other hand, the naso-pharynx is obstructed, the spray emerges from the opposite side in a very feeble stream, or even fails to emerge entirely. This is, I think, without doubt our best, and certainly our easiest test for the existence of an adenoid growth in the naso-pharynx, and one which I regard as almost absolutely diagnostic.

Graucher<sup>2</sup> states that the presence of an adenoid gives rise to changes in the auscultatory sounds of the chest, which he claims to possess a certain amount of value, stating that when the nasal passages are occluded in this way, the vesicular murmur does not

<sup>1</sup> "Diseases of the Mouth, Throat, and Nose," Eng. ed., Edinburgh, 1886, p. 107.

<sup>2</sup> *Annal. des Maladies de l'Oreille*, etc., May, 1886.

remain smooth. I should not, however, attach any great value to this diagnostic sign.

PROGNOSIS.—The prognosis in these cases is always favorable, as regards the entire disappearance of symptoms as the result of treatment. It has already been stated, that there is a tendency at puberty for these growths to atrophy to a certain extent. The question arises, then, how far we may be justified in leaving mild cases to the natural course, when the development attending upon puberty may be expected in the near future. There is undoubtedly an atrophic process, which sets in at puberty, but this does not always cause an entire disappearance of the tumor. The fact that its symptoms are markedly ameliorated, is probably due in part to the great development which takes place at that age, causing the glandular mass to occupy a relatively smaller space in the breathing passages. I think, when we consider that the treatment involves no possible risk to the patient, and furthermore that the growth is subject to attacks of acute inflammation, by which danger, oftentimes of a serious character, is threatened to neighboring organs, that we are rarely justified in adopting the expectant course. It should be stated, furthermore, that these tumors do not, as a rule, entirely disappear at puberty, but in many cases remain as a permanent source of a chronic naso-pharyngeal catarrh.

If serious ear-complications have already set in, before a case is subjected to treatment, I think we may lay it down as a rule, that in children a favorable prognosis may be given, not always perhaps as to the ultimate restoration of hearing, but as to improvement in the majority of cases, and an arrest of further extension of the disease in nearly all cases, provided, of course, that this complication is dependent upon adenoid disease, with no other complicating morbid lesion. This statement can be safely made with regard to chronic catarrhal otitis media. It is also true in suppurative disease, I think, with few exceptions. In those cases which have gone on to necrosis, we all recognize the peculiar obstinacy of the affection with which we have to deal, and yet my own experience teaches me that we are often warranted in giving a favorable prognosis, as regards improvement, even here.

TREATMENT.—The simpler methods of general medication are probably indicated in many of these cases, on account of the impairment of the general health, which is often present, as the result of disturbed sleep, and imperfect oxygenation of the blood, from interference with normal respiratory action. These measures embrace simply the administration of cod-liver oil, with general tonics. Most writers suggest the use of the iodide of iron, or some other of the iodine preparations, probably with the idea of securing the



general tonic effect of the drug, together with its alterative action, but it is very doubtful if we ever promote absorption in these growths by any internal medication. This remedy, again, is advocated on account of a supposed strumous diathesis, which underlies these growths. As already stated, scrofula is not present, as a rule. We therefore may content ourselves with the administration of some simple form of iron, combined with barks, for its general tonic effect. My own preference, however, is decidedly in favor of cod-liver oil, where tolerated, as exercising its general tonic effect in these cases, with better results than any other remedy we possess. In the majority of cases, however, probably no internal medication is indicated.

The question as to the value of local treatment by means of douches and sprays, is rather an interesting one. In the majority of ordinary catarrhal affections of the upper air-passages, the use of astringent sprays is attended with very little, if any permanent benefit. In glandular enlargements, however, of the kind under discussion, especially when we consider their very soft consistency, and low grade of organization, the use of astringents is attended, oftentimes, with the best of results, both in limiting the amount of secretion, and in securing an absolute reduction in the size of the growth. This, however, is all that is accomplished. A cure cannot be looked for, unless in the very early stages of the disease, when the growth has attained but a limited size. Furthermore, I think much can be accomplished by the use of astringents in preventing the frequent recurrence of attacks of acute inflammation, to which those suffering from the disease are so liable. The only form of medication probably, that is adapted to the disease, is that of a watery solution. A well-grounded prejudice exists against the use of the Thudichum nasal douche in adenoid disease, although Löwenberg,<sup>1</sup> Woakes,<sup>1</sup> Schech,<sup>1</sup> and Moure<sup>1</sup> recommend its use. There is no doubt that mischief may be done by the use of this device, in that the growths hanging down behind the posterior nares, so far occlude these openings, as in many cases to prevent the flow around the septum into the opposite passage. This interference with the flow we have already noticed as a diagnostic point made by Semon. Now, the nasal douche never should be used, unless the exit of the fluid from the nose is quite as free, if not freer, than its entrance, owing to the danger of its being forced into the Eustachian tubes. I think now that the ingenuity of our instrument-makers has placed in our hands so many and such efficient hand-ball atomizers at a moderate price, that preference should always be given to the spray, as a means of local application, over

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<sup>1</sup> Op. cit.

every other device, as affording a method of thoroughly reaching the part, in such a manner as to involve no possible injury to neighboring organs. We give preference then to the instrument shown in Fig. 47. Probably no better astringent can be used in these cases than tannin. My own custom is to prescribe this, in the following combination:

℞ Acidi carbolici,	.	.	.	.	.	.	gr. i.
Acidi tannici,	.	.	.	.	.	.	grs. xl.
Sodii biborat.,	.	.	.	.	.	.	grs. xx.
Glycerini,	.	.	.	.	.	.	$\frac{3}{4}$ ss.
Aquæ,	.	.	.	.	.	.	ad $\frac{3}{4}$ iv.

This is to be applied twice daily at home. One of the most troublesome features of the disease, is the large accumulation of mucus in the nasal cavities, and the difficulty the child experiences in expelling it. The above lotion is cleansing, disinfectant, and astringent, and being thoroughly applied at the hands of the mother or attendant, fulfils well these three indications.

In the absence of an atomizer, a small ear-syringe is well adapted for medicating the parts. For simple cleansing purposes, any of the following solutions may be used:

Sodii chloridum,	.	.	.	grs. x. to the ounce.
Potassii chloras,	.	.	.	grs. x. to the ounce.
Ammonii murias,	.	.	.	grs. ij. to the ounce.
Sodii benzoas,	.	.	.	grs. x. to the ounce.

To which any of the following astringents or alteratives may be added:

Zinci sulphocarbolas,	.	.	.	grs. ij. to the ounce.
Alumen,	.	.	.	grs. iij. to the ounce.
Boro-glyceride,	.	.	.	3 i. to the ounce.
Resorcin,	.	.	.	grs. ij. to the ounce.

As before stated, all that can be expected by local medication, is a modification of the symptoms. A radical cure is dependent upon a thorough extirpation of the offending glands. This must be accomplished, either by destructive agents, such as the chemical or potential cautery, or by the snare or cutting instruments. Owing to the prejudice against surgical operations in the minds of many people, we will occasionally be compelled to resort to destructive agents for the removal of these growths, although in all cases, I may state here, the complete extirpation of the growths by an operation is the preferable mode of procedure. The use of caustics is attended undoubtedly with successful results, although it involves a long course of treatment, with many repetitions of the caustic

application. Here I think the galvano-cautery possesses a destructive power which is far more active than are chemical agents, and is always to be preferred. The manipulation by which this is accomplished, is quite simple. The only risk to be avoided is of burning the soft parts. The electrode should be carried to the parts before the current is turned on, and then allowed to cool before it is withdrawn, otherwise the palate or other healthy tissues

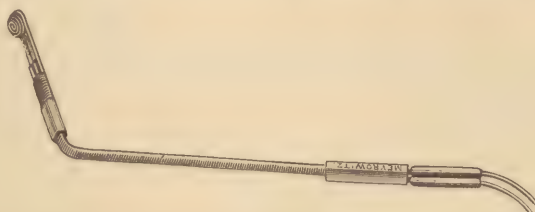


FIG. 128.—Author's Electrode fitted with a Shield for use in the Pharyngeal Vault.

would be cauterized. The electrode shown in Fig. 128, it will be noticed, is fitted with a hood in such a manner as to thoroughly protect the palate from injury in withdrawing the instrument. Löwenberg<sup>1</sup> suggests, that the cauterizing instrument should be adjusted by the aid of the rhinoscopic mirror, or by the finger introduced behind the palate. This is scarcely feasible in most cases, and is rarely necessary. In small children, it is not always feasible to introduce the curved electrode behind the palate, hence we are compelled to introduce the instrument through the nasal passages. If introduced in this manner, the platinum tip will usually strike the central portion of the mass, and a considerable destruction of tissue may thus be accomplished. Moreover, there is abundant

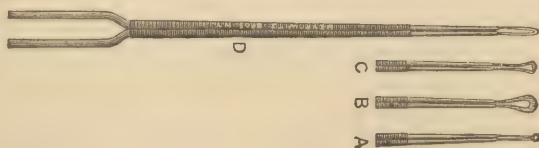


FIG. 129.—Straight Electrodes for the Application of the Galvano-cautery to the Pharyngeal Tonsil, through the Nasal Cavity.

room for a vertical movement to be permitted in this manipulation, by which successive portions of the growth may be subjected to cauterization. The electrodes by which this is accomplished are shown in Fig. 129. In the absence of the cautery-battery, chemical agents must be used. Of these, I should give preference to chromic acid fused on the end of a properly-shaped applicator, which may be arranged in the same manner, with a protecting

<sup>1</sup> Op. cit., p. 57.



hood, as the electrode already mentioned, or the applicator may be concealed in a tube, as shown in Fig. 124, and protruded after the instrument has been passed into the pharyngeal vault. Manipulation through the lower pharynx is not always tolerated by young children, and in a number of cases, where the nasal passages have admitted of it, I have made the application directly through the nares, the applicator being protected by a small slender tube, and protruded after this has been passed through the nasal cavities. This manipulation has become an exceedingly simple and feasible one, since the use of cocaine has enabled us to thoroughly open up the nasal cavity by contraction of its blood-vessels. The concealed applicator is an old device, and one which has long been used for making applications to the turbinated tissues in the nasal passages.

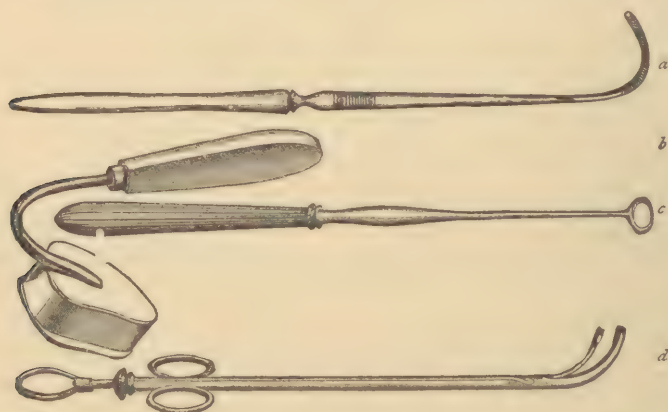


FIG. 130.--Meyer's Instruments for the Removal of Hypertrophic Pharyngeal Tonsils. *a*, Nitrate of silver applicator; *b*, mouth gag; *c*, ring knife; *d*, lithotrite-like instrument for the removal of growths on the lateral walls.

Löwenberg prefers nitrate of silver. Chromic acid, however, is a more powerfully destructive agent. Either of them are easily fused on the end of an applicator, and constitute convenient destructive agents.

As already stated, the complete extirpation of these growths by a surgical operation should always be resorted to, in preference to any other measures. Most observers who have written on the subject of adenoid growths, have presented instruments and methods of their own devising for the accomplishing of this end. Meyer<sup>1</sup> uses a ring-knife, consisting of a small transverse oval ring with one sharp though not absolutely cutting edge, as shown in Fig. 130, *c*. The patient being seated with the mouth-gag (see Fig. 130, *b*) firmly fixed in position, the ring-knife is passed through the nose, and its

<sup>1</sup> Loc. cit.

manipulation directed by the left forefinger, passed into the vault of the pharynx. In this manner, the growths are removed as far as possible on that side, when, if necessary, the knife is transferred to the other nostril, and the remainder of the tumor extirpated. Where there are portions left on the lateral walls of the upper pharynx, he completes the operation by means of the instrument, not unlike a lithotrite, shown in Fig. 130, *d*. To prevent recur-



FIG. 131.—Löwenberg's Forceps.

rence, which in a subsequent paper<sup>1</sup> he said had taken place in thirteen of his cases, he advises a weekly application of the mitigated stick of nitrate of silver, by means of the instrument shown in Fig. 130, *a*.

The use of forceps for the removal of these growths was probably first suggested by Löwenberg, whose instrument is shown in Fig. 131. It has a cutting edge on the distal extremity of the blades. Its movements are guided by the left forefinger in the pharynx or by the rhinoscopic mirror. Cohen<sup>2</sup> recommends the evulsion of the growths by a gouge-cutting forceps, modelled after Mackenzie's laryngeal forceps. Woakes<sup>3</sup> modifies Löwenberg's forceps by prolonging the cutting edge down on the posterior aspect of the blade, thus adapting the instrument to cutting on the

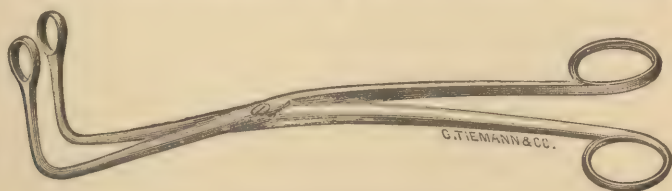


FIG. 132.—Curtis' Forceps.

posterior wall of the pharynx; while Schech<sup>4</sup> still further modifies Löwenberg's instrument, by prolonging the cutting edge completely around the three aspects of the distal extremity of the blades. Curtis<sup>5</sup> has made a still further change, in which the blades are fenestrated (see Fig. 132).

<sup>1</sup> Trans. International Med. Congress, 1881, vol. iii., p. 282.

<sup>2</sup> "Diseases of the Throat and Nasal Passages," 2d ed., N. Y., 1879, p. 262.

<sup>3</sup> Op. cit., p. 174.

<sup>4</sup> Op. cit., p. 110.

<sup>5</sup> N. Y. Medical Record, vol. xxviii., p. 446.

In the above instruments the blades all operate transversely in the pharynx. Schutz,<sup>1</sup> however, recommends the use of a forceps with a fenestrated blade operating antero-posteriorly, the only advantage of which lies in the fact that in this manner, perhaps, the pendulous masses which are occasionally found in the upper portion of the vault, are more easily seized, while those portions of the growth which lie more on the posterior wall would scarcely be grasped. Major's adenotome<sup>2</sup> (see Fig. 133) is also constructed on this principle. Its mechanism is easily understood by a reference to the illustration. The use of a curette naturally suggests itself for the extirpation of these growths, as first mentioned, I think, by Löwenberg.<sup>3</sup> His instrument has a sharp cutting edge, and is attached to its handle by

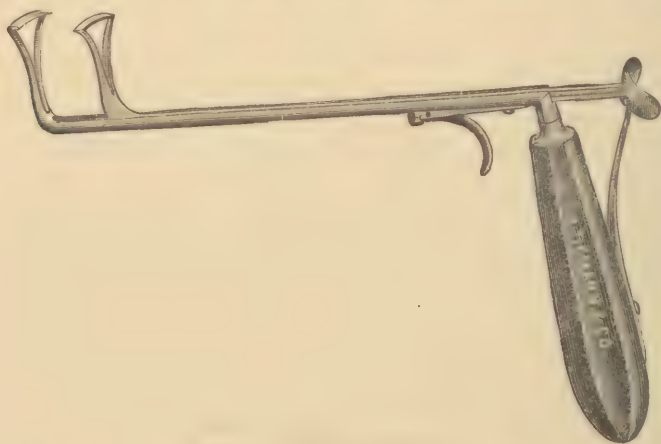


FIG. 133.—Major's Adenotome.

an S-shaped stem. Victor Lange<sup>4</sup> indorses this method of operation, while Chatellier<sup>5</sup> considers it a rather dangerous operation. Fränkel<sup>6</sup> advises it only in cases where the growths are not to be reached with the forceps. This instrument is undoubtedly available for use when the growth is small, but is not to be recommended in the case of a large growth. It is also useful for the removal of the remaining fragments if the main mass has been removed by one of the other methods. A form of curette which I make frequent use of in this manner is shown in Fig. 134. It consists of an ordinary Sims's uterine curette, with the shank bent to the proper angle for introduction to the pharyngeal vault. Traut-

<sup>1</sup> *Centralblatt für Chirurg. und Orthopaed. Mechanik*, 1886.

<sup>2</sup> *Canada Med. and Surg. Jour.*, Nov., 1887.

<sup>3</sup> *Op. cit.*, p. 62.

<sup>4</sup> *Deutsch. Med. Wochenschrift*, 1883, p. 748.

<sup>5</sup> *Op. cit.*

<sup>6</sup> *Loc. cit.*



mann advises the use of a sharp spoon, which is virtually the same device as the curette.

Guye,<sup>1</sup> of Amsterdam, dispensing with all instrumental aid, states that the growths can be entirely extirpated by the index finger inserted behind the palate, the process being accomplished, partially by crushing and partly by scraping with the finger nail. Creswell Baber<sup>2</sup> indorses this method, but is entirely correct, I think, in the assertion that their complete removal cannot be accomplished in one sitting, stating that it should be repeated at intervals of one week, till the cure is completed, which as a rule, requires four or five sittings. In the same category are the methods employed by Dalby<sup>3</sup> and Lennox Browne, who make use of a curette, or spoon, attached to a thimble, which is fixed upon the end of the forefinger. In this manipulation, the tip of the finger is left free for exploratory purposes, the shaft of the curette being attached to the posterior face of the open thimble. Michael,<sup>4</sup> of Hamburg, has devised a rather ingenious instrument, which somewhat resembles Woakes's forceps, excepting that the blade of the instrument shows a more



FIG. 134.—The Author's Sharp Cutting Curette for the Pharyngeal Vault.

extended curve, while the hollow of the instrument extends the whole length of the curved portion of the blade, which is of uniform breadth, and presents a sharp cutting edge. In addition to this, the shafts of the instrument curve outward, in such a manner as to allow the uvula to drop between them. In addition to these simpler devices, a number of somewhat complicated instruments have been devised, notably that of Delstanche,<sup>5</sup> who adapts the cutting forceps of Löwenberg to the mechanism of the ordinary laryngeal tube forceps, while Löwenberg<sup>6</sup> seems to have found it necessary, in certain cases to resort to other devices than his forceps, for in a later contribution he has presented a device which consists of a flat ring-knife, with its cutting edge on the inner border of the ring. Over this fenestra is fitted a protecting steel-plate, manipulated from the handle of the instrument. When the knife has been introduced into the vault of the pharynx the protecting plate is with-

<sup>1</sup> Transactions of International Med. Congress, London, 1881, vol. iii., p. 290.

<sup>2</sup> *Annales des Maladies de l'Oreille*, etc., May, 1885, p. 98.

<sup>3</sup> *London Lancet*, October 2d, 1886, vol. ii., p. 14.

<sup>4</sup> *Berlin. Klinische Wochenschrift*, 1881, No. 5, p. 67.

<sup>5</sup> *Annales des Maladies de l'Oreille*, etc., May, 1885.

<sup>6</sup> *Deutsche Med. Wochenschrift*, 1886, No. 16, p. 265.

drawn, and the instrument swept from one side of the pharynx to the other, thus severing the presenting growths, the plate being thrown into position again, before the withdrawal of the instrument. Still other instruments, more resembling the tonsillotome, have been suggested by various writers. Thus Störk adapts a ring knife to his universal laryngeal handle, while Delstanche advises the use of what he calls a *serre-nœud*, which consists of a stout watch spring which is operated by a mechanism similar to that in his instrument already described. We thus find various writers advocating strikingly dissimilar methods for the extirpation of these growths. The question arises which is the most simple and efficient instrument for accomplishing the purpose. I have always entertained a prejudice against the use of forceps, as being a rather unsurgical method. Most of the writers who recommend them, also acknowledge that the operation cannot be completed at one sitting; these same writers also, as a rule, operate without an anæsthetic, the patient, if young, being fastened to the chair, although Hooper<sup>1</sup> states that the complete extirpation of the growth may be secured at one sitting by the forceps-operation, with the palate thoroughly retracted, and the patient being under the influence of an anæsthetic, a mouth-gag also being in position. The same method is pursued by Fränkel,<sup>2</sup> who has devised a modification of Whitehead's mouth-gag, by the addition of a tongue depressor, which forms part of the instrument itself, and a self-retaining Voltolini palate hook. A similar instrument has been devised independently by Swinburne.<sup>3</sup> With wide access to the pharynx thus secured, we can easily understand how a growth may be entirely extirpated at one sitting, were it not that the flow of blood is rather profuse at the first step of the operation, which will necessarily seriously hamper further procedure. In some cases certainly, as Hooper suggests, a sufficient time may be permitted to lapse after each introduction of the forceps, to allow the hemorrhage to cease. In spite of this, many cases will be attended with hemorrhage, sufficient to interfere with this method of operating. Hooper extracts the growth by means of a forceps (shown in Fig. 135, 1) which is very similar to that of Löwenberg, with the exception that the cutting edge of one blade slightly overlaps that of its fellow. The mouth is held open by a mouth gag, which differs in no essential feature from that of O'Dwyer (Fig. 135, 2), while the palate is elevated by a Voltolini palate-hook (Fig. 135, 3). As regards Meyer's method of operating, we can only say, in view of the excellence of his results, that no better method of procedure can be suggested, provided one possess

<sup>1</sup> Loc. cit.<sup>2</sup> Trans. International Med. Congress, 1881, p. 333.<sup>3</sup> N. Y. Med. Record, vol. xxiv., p. 373.

his manipulative skill and dexterity. It should be said, however, that it seems somewhat complicated, and at the best, not an easy operation to perform with very young children, especially when we consider that he operates without an anæsthetic, his patient being fastened to a chair. The method which will commend itself probably to an unskilled operator, or one not a specialist in throat diseases, is either the use of the long-handled curette, or Dalby or Browne's finger curette, or perhaps in a still larger number of cases, Guye's suggestion of the unarmed index finger. This operation I think should always be done under an anæsthetic, which will afford

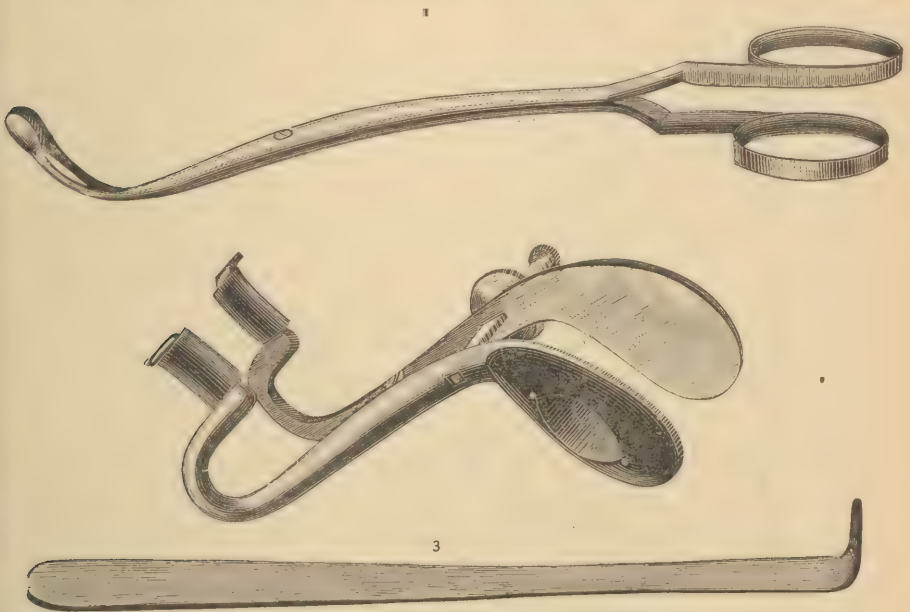


FIG. 135.—Hooper's Instruments for the removal of Hypertrophied Pharyngeal Tonsils. 1, Forceps; 2, mouth gag; 3, palate retractor.

ample time for a fairly thorough disorganization of the growth, if not its complete extirpation. It need scarcely be added, furthermore, that the mouth-gag should be used in all cases. By this method, a complete cure at one sitting need never be anticipated. As regards the more complicated instruments of Delstanche, Störk, Löwenberg and others, they possess probably equal merit, but will scarcely come into general use. For a rapid method of removal, without resort to anæsthesia, mouth-gags, or palate retractors, I have for a long time made use of a modification of Jarvis's snare, first described some years since,<sup>1</sup> and which is shown in Fig. 136.

<sup>1</sup> "Adenoma of the Vault of the Pharynx," Amer. Journ. of Otology, vol. iv., 1882.



It consists of an ordinary snare fourteen inches in length; the end of this is curved in a quadrant of a circle whose radius is one and one-fourth inches. This is now mounted with a No. 5 piano-wire, which I regard as by far the most useful size, as combining elasticity, strength, and resistance.

Having observed the growth and carefully estimated its size, a loop is formed which will embrace it, and is then bent forward over the end of

the instrument, in order to give it a decided kink. The wire is now played out of the snare about an eighth of an inch, and the whole loop is now thrown backward toward the handle of the instrument, giving it another bend. As will be seen, it is in a position for easy introduction behind the palate, without touching the parts, and may be passed immediately to the base of the growth. The palate of course is now immediately retracted by reflex irritation, but only embraces the tube of the snare, without in any degree hampering the manipulation.

The instrument is now held firmly in place, while the loop is rapidly drawn in by turning the screw. The action of the bends in the wire loop is now perceived. As the wire is drawn in, the loop is thrown backward with considerable vigor, and embraces and severs the growth. In this manner even a broadly sessile growth is easily seized and extirpated. There is but trivial hemorrhage, but little pain or retching, and the whole manipulation is accomplished very easily, simply, and speedily. After the withdrawal of the instrument, the tumor is expelled through the nose by blowing. Occasionally it drops into the pharynx below, but this is very rare. In no case has any patient experienced the slightest annoyance from the growth dropping too far down in the air-passages, nor do I regard this as an accident that is liable to happen. The operation by this method has rarely required an anæsthetic.

Occasionally in the case of children, in whom the control of the faucial movements prevented the manipulation, I have been compelled to give an anæsthetic and resort to another method, which may be described in a few words. In these cases the growth was severed

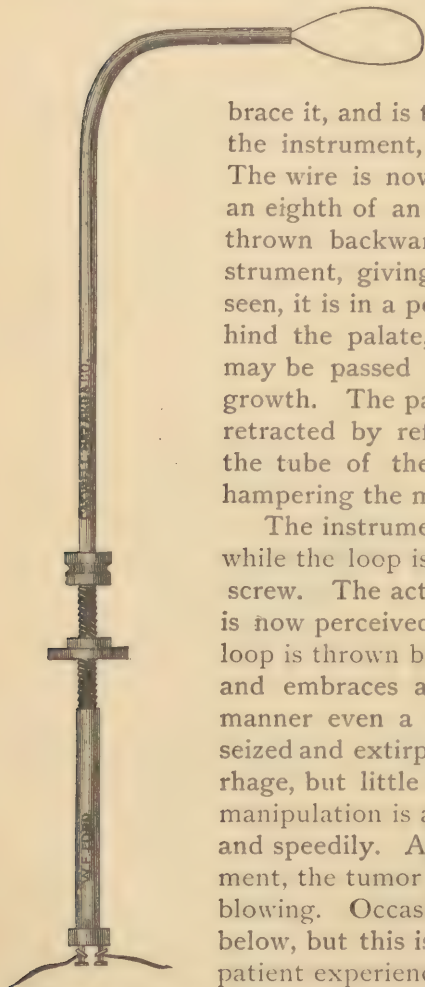


FIG. 136.—The Author's Modification of Jarvis's Snare-écraseur for the removal of an Hypertrophied Pharyngeal Tonsil.

by passing an ordinary straight snare through the nose. Having mounted the snare with the wire, the loop was bent sharply down over the end of the instrument, giving it a kink, and then drawn within the tube until a loop only remained sufficiently small to pass through the nares; this was passed vertically until the loop was in the pharynx, when the instrument was turned, bringing the loop into a horizontal position, with the side undermost toward which the larger loop had been bent. The wire was now played into the pharynx, when the bend which had already been given it threw the loop downward, nearly to a right angle. The whole instrument was now pressed firmly against the pharynx, which, as will be seen, threw the loop over the growth. Holding the instrument firmly pressed against the pharynx, the screw was rapidly turned and the growth severed. As soon as the instrument was withdrawn, the child's head was drawn over the table with the face downward, and the trifling hemorrhage allowed to go on for a few moments, when the same manipulation was repeated through the nasal cavity of the opposite side, after which the child was easily aroused, when the masses were expelled by blowing the nose.

In this manner, as a rule, the whole growth may be removed, but in the first-described manipulation portions may be left. This, as well as their location, is easily ascertained by examination, and the manipulation repeated. This may be done a number of times at one sitting, entailing but little annoyance or weariness to the patient.

An additional advantage of the use of the snare, is in the fact that the hemorrhage is less than when cutting instruments are resorted to. Hartmann<sup>1</sup> has also recommended the use of a snare, in which the wire loop is concealed in a stiff ring, which enables it to be carried into position before it is drawn home. The serrenœud of Delstanche also is a somewhat similar instrument.

The galvano-cautery snare as recommended by Voltolini, Michel,<sup>2</sup> of Cologne, Sajous,<sup>3</sup> and others, offers no advantages over the cold snare, and is much more difficult of manipulation.

The use of electrolysis, as recommended by J. R. Briggs,<sup>4</sup> is one of which I have no experience, and yet it seems well worthy of trial, in those cases where there is a prejudice against surgical interference. The anode, consisting of an ordinary sponge electrode, is held by the patient. The cathode is an insulated gold-pointed needle and is thrust into the vegetations, and the current is passed

<sup>1</sup> Deutsche Med. Wochenschrift, 1881, No. 9.

<sup>2</sup> Trans. Internat. Med. Congress, 1881, vol. iii., p. 333.

<sup>3</sup> "Diseases of the Nose and Throat," Philadelphia, 1887, p. 233.

<sup>4</sup> Texas Courier of Medicine, December, 1886.

until the vegetations shrivel up. About ten elements of a Stöhrer battery are used. Michel,<sup>1</sup> of Cologne, in indorsing a similar method of procedure, rather discouragingly states that it requires from forty to ninety sittings to complete a cure, extending over a period of from six to eight months.

The question of the administration of an anæsthetic is one which every operator will decide for himself, in individual cases. In adults, and older children, it will rarely be necessary. In young children, however, whatever the operation, it will be found necessary to administer chloroform or ether. If the operation is prolonged, complete anæsthesia will be necessary, and, therefore, ether is to be preferred. In the shorter operations, by means of a cutting instrument, or my own operation by the snare, complete anæsthesia is not necessary. I have always found that a few whiffs of chloroform answer every purpose. The child will become completely relaxed, and will remain so, until the operation is completed. In this manner, I think, we incur none of the dangers attendant upon the use of chloroform, and furthermore, none of the disagreeable features of etherization are encountered.

Fränkel<sup>2</sup> and Moldenhauer<sup>3</sup> both object to the use of chloroform as an anæsthetic, as introducing an element of danger into an operation otherwise unattended with risk. Both these writers, in operating on children, advise that the arms and legs shall be thoroughly controlled by bandaging, and administer no anæsthetic. I think, in these operations, control of the limbs is of less importance than relaxation of the faucial and palatal muscles, which can only be secured by general anæsthesia. This is secured fully in the primary anæsthesia, produced by the administration of chloroform, which, furthermore, is not attended, I think, with any danger. My plan is to sprinkle perhaps half a drachm of chloroform on a handkerchief, and seizing the child, surreptitiously, as a rule, the handkerchief is held firmly over the mouth and nose, while at the same time, he is drawn down on the lap, and held firmly. Primary anæsthesia is thus secured, and the operation completed, before he is aware that anything has been done. In all cases, probably, whether a general anæsthetic is used or not, it is wise to apply a ten or twenty-percent solution of cocaine, to secure such local anæsthesia as it may afford, together with the vascular depletion which attends its use. Of course, this will always be used when operating without general anæsthesia, and yet it should be stated, that its action upon the glandular hypertrophies of the pharyngeal vault is very unsatis-

<sup>1</sup> Monats. für Ohrenheilkunde, 1887, No. 5.

<sup>2</sup> Loc. cit., p. 23.

<sup>3</sup> "Die Krankheiten der Nasenhöhlen," etc., Leipzig, 1886, p. 169.



factory. It modifies possibly the pain of an operation, but does not absolutely control it.

The question of recurrence has been discussed by most writers, and all concur in the statement, that complete extirpation is never followed by a return of the growth. Meyer,<sup>1</sup> in writing on this subject, eleven years subsequently to his first paper, stated that out of one hundred and two cases first reported, there was a recurrence in thirteen, although he attributed this to a lack of thoroughness in the treatment, agreeing with Fränkel,<sup>2</sup> who states that when recurrence takes place, it is undoubtedly due to a lack of thoroughness in the original operation. The importance, therefore, of a thorough removal of all offending tissue, cannot, I think, be overestimated, notwithstanding that so close an observer as Löwenberg,<sup>3</sup> both in his original brochure and in a subsequent paper,<sup>4</sup> states that sufficient will have been accomplished by the operation, when free nasal respiration is established.

SEQUELÆ.—Hemorrhage very rarely occurs in a degree sufficient to demand interference. If such an accident should occur, a tampon inserted into the pharyngeal vault is usually sufficient to control it. Acute otitis media has been mentioned by Meyer, Fränkel, and others, as occurring after an operation upon these growths. Fränkel states that it is more liable to occur after a secondary operation, and especially when this is done too soon after the previous sitting. It is probably more liable to occur as the result of the use of the curette or forceps, on account of injury done to healthy tissues. Another accident which attends the operation in a certain proportion of cases, is the occurrence of a fibrinous exudation on the cut surface, giving rise to an ordinary attack of acute follicular disease of the vault of the pharynx, extending in many cases to the follicles of the lower pharynx. This is accompanied with a rapid pulse, general febrile motion, muscular pains, sore throat, painful deglutition, and indeed, all the local and general symptoms of an attack of that disease, and is to be treated in much the same manner as the idiopathic affection. This does not ordinarily seriously complicate the operation, or interfere with its success, although in a few instances I have thought that it seemed to stimulate the tissues to a renewed activity, under which a partial recurrence of the growths supervened. I know of no way to prevent this complication.

<sup>1</sup> Trans. Internat. Congress, 1881, vol. iii., p. 382.

<sup>2</sup> Loc. cit., p. 30.

<sup>3</sup> "Tumeurs Adenoides du Pharynx Nasal," Paris, 1879.

<sup>4</sup> Deut. Med. Wochenschrift, 1886, No. 16, p. 265.

## CHAPTER XLIII.

### FIBROMA OF THE NASO-PHARYNX.

THIS term is used to designate a form of neoplasm of the nasopharynx which is composed almost purely of fibrous tissue. Springing from the basilar process of the occipital bone, and increasing by a somewhat slow process of growth, it gradually invades neighboring cavities, sending prolongations into the nasal passages and into the pharynx below, while at the same time it pursues the same relentless course as fibroma in the nasal cavity, crowding all the tissues before it, and resulting in absorption both of the soft tissues and bony structures, which intrude themselves upon its path.

The tumor is essentially a sessile growth from its onset and during its course, and although occasionally reported as a nasopharyngeal polypus, it never assumes the gross characteristics of a polypus, in that during its development its attachments spread out and broaden, in proportion to the increase in the size of the neoplasm, in contradistinction from what we usually regard as a polypus, in which the tumor itself attains even large proportions, while it is still attached to the part from which it sprang by means of a narrow pedicle.

ETIOLOGY.—It is difficult to assign any active cause for the development of these growths, in that they arise from tissues showing no evidence of morbid activity, and in individuals apparently in the enjoyment of perfect health.

In the majority of instances, they occur in males, and usually at about the age of puberty. Nélaton, Dolbeau, Gosselin, and other of the earlier surgeons, seem to have entertained the view that the disease was met with exclusively among males. Pluyette,<sup>1</sup> however, making a special investigation of this point, has collated twenty cases of nasopharyngeal growth occurring in females, nine of which were undoubtedly true fibromata. In general, these growths occur from the ages of fifteen to twenty-five years, while in females the average age is slightly greater. Mackenzie<sup>2</sup> suggests that the frequency with which these cases are reported by French

<sup>1</sup> *Revue de Chir.*, 1887, vol. vii., pp. 202 and 223.

<sup>2</sup> "Diseases of the Throat and Nose," Amer. ed., Phila., 1884, vol. ii., p. 496.

surgeons, might indicate their greater frequency of occurrence in France than in England. The same might be said in regard to Germany. The very abundant literature of the subject, however, in the French and German reports, I take it, merely indicates the activity of this form of investigation, characteristic of the surgeons of these nations. When we consider the very great frequency of uterine fibroids among the colored races, we might naturally anticipate a similar frequency of fibromata of the upper air passages, and yet, as a matter of fact, I know of no recorded instance of a fibrous tumor of the naso-pharynx occurring in a negro.

**SYMPTOMATOLOGY.**—These growths usually manifest themselves very early in the history of their development, one of the first symptoms, perhaps, being the occurrence of repeated attacks of epistaxis, which may be exceedingly violent in character. The source of this bleeding may possibly be from an erosion of the mucous membrane against which the tumor impinges, but probably, in the majority of instances, it arises from the blood-vessels coursing on the surface of the growth itself, for, as is usually the case in fibroid tumors of the upper air passages, the tumor is exceedingly vascular in character. These hemorrhages may consist of a slight oozing at times, but usually it is a persistent and long-continued flow of blood, oftentimes lasting many hours, and even days. Furthermore, the hemorrhage repeats itself sooner or later, and is especially liable to occur after violent exercise, although usually it comes on without any apparent cause. In two instances which came under my own observation, there seemed to be a disposition to the occurrence of the epistaxis during sleeping hours, the patients being awakened by the choking sensation produced by the flow of blood into the air passages. This bleeding also may occur before the tumor has obtained sufficient size to produce other notable symptoms, although, as its size increases, the tendency to hemorrhage also increases. The presence of the growth is indicated by a sense of fulness in the naso-pharyngeal region, with a very early impairment of the voice, which assumes the characteristics of the "dead voice" observed in connection with adenoid disease of this region, the symptom being due to the fact that the propagation of vocal waves into the resonant chambers of the nose is prevented by the mechanical presence of the tumor. As the growth increases in volume, it hangs down over the posterior nares, closing them as if by a curtain, thus giving rise to nasal stenosis. This is usually bilateral in character, in that the tumor springs from the central portion of the basilar process, and develops symmetrically until its progress is deflected or hampered as it impinges upon normal structures.



With the occurrence of stenosis there develops, furthermore, the peculiar facial expression always met with in naso-pharyngeal tumors, which consists of an apparent broadening of the bridge of the nose, which, in connection with the open mouth which results from the interference with normal nasal respiration, gives a peculiar expression of vacancy or stupidity to the patient. As still further development occurs, and as the prolongations make their appearance in the nasal cavity, and extend, perhaps, into the accessory sinuses, there results a genuine facial deformity, in that the nasal bones, or the nasal processes of the superior maxillæ, are crowded forward on one or both sides, thus obliterating the malo-nasal fold, while, at the same time, the bridge of the nose is thus broadened, and that peculiar facial deformity results which is usually designated as "frog face." These prolongations into the nasal cavity may extend forward, and make their appearance at the nostril, or they may make their way into the accessory sinuses, distorting these cavities, and showing evidence of this extension by additional facial deformity. A still further progress may be observed, toward the cavity of the orbit, giving rise to exophthalmos, this occurring either as the result of a direct invasion of the orbit, or in consequence of the lifting of the orbital plates by the pressure of the growth from behind. The occurrence of exophthalmos would indicate, probably in the majority of instances, the invasion of the antrum, although it may be due to an invasion of the ethmoidal cells.

A certain amount of excessive secretion results from the presence of these growths, which consists of thick, tenacious mucus or muco-pus. As the result of the presence of the tumor, the normal movements of the fauces are notably hindered, and this secretion tends to become inspissated, and thus accumulates in and about the growth and is voided with considerable difficulty. At the same time, the secretions also in the nasal cavity proper become altered, in that normal nasal respiration is arrested, and the normal process of voiding mucus impaired, the secretion from the nose being of a sero-mucus, or even watery character, and occasionally mixed with the muco-pus, the source of which is in the pharynx. The secretions are at all times liable to be more or less tinged with blood, which, as before stated, has its source probably in the blood-vessels of the neoplasm itself. As the growth extends into the lower pharynx, it impinges upon the soft palate, crowding it forward into the mouth, and thus interferes, not only with the act of deglutition, but also prevents the closure of the palato-pharyngeal space, as a consequence of which fluids are liable to be forced into the nasal cavity during the act of deglutition. Dyspnœa may occur later in the disease, owing to the extension of the growth

downward, and the mechanical interference with the entrance of air into the lungs.

**PATHOLOGY.**—These tumors are composed almost entirely of dense, white fibrous tissue, containing very few if any elastic fibres. According to Muron<sup>1</sup> a cross section of the growth, examined under the microscope, shows the presence of these fibres, displayed usually parallel with each other, although they show a tendency to interlace in every direction. Scattered here and there, are observed blood-spaces of varying sizes, the smaller ones being surrounded by a single layer of fusiform cells, while in still larger ones these cells are displayed in two, three, or four layers, according to the size of the spaces; while in the largest spaces there is found a fairly well developed vascular wall, with its three coats well differentiated.

In addition to this, there are found scattered somewhat sparsely through the tissue numbers of fusiform cells or multinuclear bodies, embedded between the fibres (see Fig. 137). The whole growth is inclosed apparently in a capsule, which consists probably of the mucous membrane covering the part from which the tumor originally sprang, distended and somewhat attenuated, in that it is composed only of the



FIG. 137.—Fibroma. (Author's case reported on page 585.) *L*, Coarse bundles of fibrous connective tissue; *T*, bundles, cut transversely; *C*, capillary blood-vessels; *G, G*, multinuclear bodies.

connective-tissue layer covered with epithelial cells. Coursing beneath this capsule, however, are a large number of blood-vessels, which are visible even on gross inspection. These probably are the nutrient blood-vessels of the tumor. Their walls, however, are exceedingly thin, and rupture on very slight injury, hence, these vessels are probably the source of much of the hemorrhage, which occurs so frequently in connection with these tumors.

The growth is regularly rounded in outline at its onset, while subsequently its shape is modified by the bony walls of the cavity which it invades. The origin of these tumors is probably in all cases from the periosteum of the basilar process of the occipital

<sup>1</sup> Comp. Rendu de la Soc. de Biol., 1869, Paris, 1870, 5 s., vol. i., pp. 223-225.

bone, although it may in part arise from the body of the sphenoid adjoining. At their onset, they spring probably from a comparatively small area, but as they develop, their point of attachment increases to a certain extent, proportionately with the growth of the tumor; and furthermore, in addition to this spreading of the base, new attachments arise, which oftentimes lead to confusion as to the original source of the neoplasm. This question, as to the primary origin of the tumor, becomes somewhat important, and has been the subject of special investigation by Beuf,<sup>1</sup> Brevet<sup>2</sup> and D'Ornellas,<sup>3</sup> who agree essentially with Nélaton, in the view that these tumors invariably spring from the base of the cranium, and that, in those cases in which there is an apparent origin from the bodies of the vertebræ, the wings of the sphenoid, or from the parts lower down, this is due, either to the burrowing, as it were, or spreading of the original attachment. As the tumor extends to neighboring parts and cavities, adventitious attachments are formed, as the result, probably, of localized inflammatory action.

DIAGNOSIS.—A fibroma can be recognized, even at its onset, by an inspection of the vault of the pharynx, by means of a rhinoscopic mirror, when it will be seen as a small, irregularly rounded growth, of a light pinkish color, springing from the upper portion of the cavity, the gross appearances of the tumor giving the impression of a whitish mass seen through a pinkish veil as it were composed of capillary vessels, while coursing on its surface can be observed oftentimes the larger blood-vessels. In addition to this, in order to test the density of the growth, the vault of the pharynx can be explored by means of the index finger, when the tumor will be found hard, dense, resisting, and to a certain extent immovable. This manipulation, however, should be resorted to with considerable care, in that troublesome hemorrhage can easily be excited. In addition to this, if the nasal cavities are thoroughly exsanguinated by the use of cocaine, it is not impossible, frequently, to observe the growth by direct inspection through these passages, when it also will present itself to the eye behind the posterior nares, in its light, pink hue, in notable contrast as regards color to the pituitary membrane. In this connection, a probe, delicately manipulated, may serve to aid the diagnosis, in that the very slight mobility, and the dense character of the growth, can in this manner be recognized. As the tumor develops in size, in connection with the characteristic symptoms of nasal stenosis, repeated attacks of epistaxis, etc., the in-

<sup>1</sup> Thèse de Paris, 1857, No. 69.

<sup>2</sup> Thèse de Paris, 1855, No. 117.

<sup>3</sup> "Anat., Path. et Traitement des Polypes Fibreux de la Base du Crâne, dits Naso-Pharyngiens." Paris, 1854.



spection and palpation become a much simpler matter, and the diagnosis becomes comparatively clear.

A fibroid tumor in the upper air-passages, when brought under inspection, presents gross appearances to the eye which resemble no other form of neoplasm met with in these regions. An osteoma can always be recognized as such, by means of the probe or the needle. Chondroma is exceedingly rare in the naso-pharynx, and presents a decidedly warmer and deeper red color, with a yellowish tinge, is absolutely immovable, manifests no tendency to hemorrhage, and can be subjected to palpation with impunity, and finally, its dense cartilaginous consistency can be determined by means of the needle. Malignant growths present no gross appearances, which in any way need lead to confusion. The only diagnostic point really of importance in this connection, is as to the origin of the tumor from the nasal cavity proper, or from the naso-pharynx, its fibroid character having been recognized. This question is not always easy of determination, where the growth has obtained such proportions as to have invaded one or the other of the nasal passages. Dolbeau<sup>1</sup> takes the ground, that a naso-pharyngeal growth produces unilateral nasal stenosis, while nasal fibroma gives rise to bilateral stenosis, a diagnostic point which he seems to regard as of considerable importance. I am disposed to think that the converse is true, and that a growth springing from the basilar process, and developing, as it usually does, symmetrically, will hang down over the posterior nares, in such a way as to produce an equal amount of obstruction on both sides. Hence, I am disposed to say, that a fibroid tumor, which in its incipency produces bilateral stenosis, can in the majority of the instances be regarded as of basilar origin, while a tumor which produces unilateral stenosis early in its development, springs from the nasal cavity proper.

A decision, then, must be based on a careful analysis of symptoms, added to such information as may be obtained by the gross inspection and examination of the growth with our improved methods of examining the nasal cavities and naso-pharynx, facilitated, as they are so greatly at the present day, by the local anæsthetic action of cocaine, together with its constringent effect on the blood-vessels.

PROGNOSIS.—Naso-pharyngeal fibroma in itself is not necessarily a fatal disease, and yet, when we consider the fact that there is no limit to its growth, that its progress is oftentimes marked by the occurrence of grave complications, that it may very early in its history encroach upon vital parts, and, finally, the very serious character of the operations which heretofore have been so frequently resorted

<sup>1</sup> *Gaz. des Hôpitaux*, 1862, p. 530.

to for its removal, it becomes an exceedingly grave affection. The principal complication during the development of the tumor, consists of the repeated attacks of hemorrhage, which may serve to markedly impair the general health, or may even result in a fatal termination. These growths develop in such directions as offer the least obstacle to their progress. Hence, after the pharynx becomes filled they extend forward into the nasal cavity and downward into the lower pharynx, where their presence may give rise to death from asphyxia, as occurred in a case of a boy, five years of age, observed by Nélaton.<sup>1</sup> If the cranial cavity is invaded, this occurs only during the latter stage of the disease, after the tumor has attained a very large size, and has invaded the nasal cavity, where it finds a more vulnerable entrance to the cranium, through the cribriform plate of the ethmoid, or through the sphenoidal cells, as occurred in a case of Nélaton's.<sup>2</sup>

Invasion of the cranium, as the result of erosion of the basilar process, probably never occurs, but the growth may send a prolongation through the foramen lacerum medius, as occurred in a case operated on by Shradz;<sup>3</sup> this complication having been discovered after death, the patient dying upon the operating-table, after resection of the superior maxilla. These growths rarely, if ever, develop after puberty, but during earlier years their growth is somewhat rapid. With the attainment of puberty a notable arrest of development is very frequently observed, which may in rare instances go still further, and result in a retrogressive movement, under which a tumor may completely disappear. This spontaneous disappearance of a fibroma has been observed by La Font,<sup>4</sup> in a young man, aged twenty-four, in whom a growth, involving the nasal cavity and the antrum, had existed for several years, complete disappearance taking place at the end of six months from the time of its greatest development. A still more interesting case was reported by Gosselin<sup>5</sup> as follows:

A young man, aged 22 years, presented with an enormous naso-pharyngeal fibroma, impinging upon the base of the tongue, while at the same time sending prolongations into the nasal cavity. The great dyspnœa, and the repeated attacks of severe hemorrhage, had resulted in such impairment of the general health, as to render any radical operative procedure hopeless. An attempt was made to modify the growth by electrolysis, injections, and caustic applications, with but little success, although the patient's life was prolonged for six months, when a rapid extension of the tumor occurred, giving rise to exophthalmos, with symptoms of brain pressure. The case being regarded now as utterly

<sup>1</sup> Cited by Beuf, loc. cit., p. 24.

<sup>2</sup> Loc. cit., p. 16

<sup>3</sup> N. Y. Med. Record, Sept. 9th, 1882, p. 311.

<sup>4</sup> Gaz. Hebdom., 1875, vol. xxii., p. 37.

<sup>5</sup> "Leçons de Clinique Chirurgicale," Paris, 1873.

hopeless, all measures of treatment were abandoned, upon which there supervened a process of reabsorption, resulting, at the end of two years, in the complete disappearance of the tumor, and an entire restoration of health.

The following case of Grynfeldt's<sup>1</sup> is interesting, in that this reabsorption of the tumor set in at a much earlier age, and progressed more slowly.

A boy, aged 14, presented with a naso-pharyngeal tumor, completely filling the upper pharynx, and extending to and pressing upon the soft palate, completely closing both posterior nares. Several operations were attempted without success, and finally Grynfeldt performed partial resection of the superior maxilla. He only succeeded, however, in removing a portion of the tumor, although making several attempts at different times. Operative procedure being abandoned, the boy was discharged, reappearing, however, seven years later, perfectly restored to health, when an examination revealed a small, dense tumor in the pharyngeal vault, about the size of a pea, at the site of the original neoplasm.

Another method, by which these tumors disappear, is by sloughing, cases of this sort having been reported by Vimont<sup>2</sup> and Birkett.<sup>3</sup> These cases of spontaneous disappearance of the growth, however, are of such rare occurrence, as to scarcely modify the view, that we must regard this affection as one of very serious import, in that a somewhat large percentage of cases result fatally. And yet, I think, when we carefully examine the statistics of the subject, we find that death results from operative procedures instituted for the removal of the growth, in more cases than from the disease itself. Of course, these patients would die if they were not operated upon, and, in former times, these radical operations, such as removing the upper jaw, etc., were fully warranted, in that they afforded at that period, the only available means of reaching the tumor. With the improved methods of our own day, by means of which all affections of the upper air passages are brought so completely within reach for operative procedure, we may undoubtedly look for better results of treatment, in that many cases of naso-pharyngeal fibroma will now be operated upon, without subjecting the patient to the somewhat grave operation of resecting the superior maxilla. Hence, our prognosis is not to be based entirely on former statistics. Basing our prognosis, therefore, on cases subjected to the radical operations, as before stated, it becomes exceedingly grave. Basing our view, however, on what has been accomplished in more recent days, it is probably safe to give a favorable opinion in a fairly large proportion of cases. This view is certainly justified by the admirable report made by Lincoln<sup>4</sup> who in a collation

<sup>1</sup> *Gaz. Hebdomadaire de Montpel.*, 1882, vol. iv., p. 196 et seq.

<sup>2</sup> Cited by Brevet, *loc. cit.*, p. 20.

<sup>3</sup> *British Med. Journal*, Feb. 13th, 1858.

<sup>4</sup> *Trans. Amer. Laryngol. Assoc.* for 1883, p. 86.



of fifty-eight cases, on whom seventy-four operations were done, has shown us that of these, thirty-eight operations involved opening the face by the resection of the superior maxilla, or similar methods, resulting in

A cure in, . . . . .	10 cases
Death from the operation in, . . . . .	8 "
Recurrence in, . . . . .	11 "
Record incomplete in, . . . . .	9 "

An operation was done through the palate, in seven cases, of which there was

A cure in, . . . . .	2 cases
Recurrence in, . . . . .	2 "
Death on the table in, . . . . .	1 case
Records incomplete in, . . . . .	2 cases

Evulsion was practised in four cases, resulting in

Cure, . . . . .	2 cases
Death, . . . . .	1 case
Report incomplete, . . . . .	1 "

The ligature and snare were used in three cases, resulting in

Cure, . . . . .	1 case
Recurrence, . . . . .	2 cases

Electrolysis was used in three cases, as follows:

Cured, . . . . .	1 case
No report in, . . . . .	2 cases

Écraseur, with recurrence, 1 case. Scissors and cautery, 1 case, no recurrence. Injection of sulphate of zinc, 1 case, no recurrence. Scraping with the finger curette, 1 case, cured. The galvano-cautery écraseur was used in 14 cases, with

Cured, . . . . .	11 cases
Recurrence, . . . . .	3 "

We thus find of the thirty-eighty severe operations done, but ten cases were cured, while with reference to the milder operations, the statistics are much more favorable. Furthermore, it will be found, on a careful scrutiny of the reports, that the simpler operations were not done on selected cases, and that even where the tumor has attained large proportions, and given rise to serious complications, we are warranted in giving a far more favorable prognosis if a milder operation is to be resorted to, than where the patient is to be subjected to the additional risk of opening the face.

TREATMENT.—The surgeons of ancient times recognized tumors of the naso-pharyngeal cavity, and attacked them apparently by much the same methods as are often used at the present day. Thus

Hippocrates, placing a loop around the growth, extracted it by evulsion, or cut it out by means of the knife. Albucasis extracted them by means of the forceps, together with a sharp hook. Fabricius devised a special forceps with a curved blade, by which the pedicle could be more thoroughly seized in their removal; while Celsus, seizing the growth by a hook, dragged it down, while its separation was facilitated by means of a two-edged spatula. Joba-Meckren<sup>1</sup> was perhaps the first to make use of the scissors for the removal of these neoplasms.

These various methods of treatment, while available in certain cases, in their earlier development, of course proved inadequate for the removal of larger growths, and it seems somewhat singular that more radical methods should not have been undertaken earlier, and yet this was not done until 1832, when Syme<sup>2</sup> and Mott<sup>3</sup> independently conceived the idea of obtaining free access to tumors of this cavity, by the removal of the superior maxilla, and made successful use of this method of operating; although, it should be stated, that complete resection of the upper jaw had already been done by Gensoul in 1827, while partial excision had been practised as far back as 1693 by Acoluthus.

Undoubtedly many cases occur, in which on account of the size of the tumor, this serious operation will be demanded, and yet there can be no question, as has already been shown, that the nicer manipulations which characterize the surgery of the present day, will enable us to successfully extirpate the neoplasm, in a far larger proportion of cases than hitherto, with the result of a very marked improvement in the percentage of cures. There are a number of devices which may be resorted to for the destruction or extirpation of these growths, by which the patient is saved from the danger of the radical operation, rendered so hazardous as it is in so many cases, from the fact that the patient is already depleted by the untoward complications which so frequently accompany the development of the tumor. The use of caustics superficially applied for the destruction of the growth offers but little hope either of arresting its progress, or reducing its size, in that the dense, fibrous tissue of which it is composed is not easily amenable to the destructive influences of these agents, and, furthermore, the mere size of the growth should discourage any such endeavor. Barthelemy<sup>4</sup> reports the case of a fibroma, completely filling the naso-pharynx, and projecting into the mouth, which had recurred after a previous

<sup>1</sup> "Observat. Med.," chap. xi.

<sup>2</sup> Edin. Med. and Surg. Jour., 1832, p. 322.

<sup>3</sup> Amer. Jour. of Med. Sciences, 1843, N. S. vol. v., 89-91.

<sup>4</sup> Arch. Générale, 1880, p. 353, et seq.

operation by incision of the soft palate, which was eradicated by injections of a saturated solution of chloride of zinc, twelve injections having been required, while in another, and very similar case, having failed to extirpate the growth by means of the *écraseur*, forceps, and other methods, he incised the palate, and made injections of the same preparation of zinc into the body of the tumor, partially through the incision made in the palate, and partially through the nose. After each injection, a sufficient time was allowed to elapse, until the slough had separated. This was usually from ten to twelve days. The growth was destroyed by nine injections. Upson<sup>1</sup> also reports having successfully treated three cases of nasopharyngeal growth, by injections of acetic acid, for which he devised a special syringe, consisting essentially of an ordinary hypodermatic syringe, armed with a long, curved needle, over which is fitted a canula, by means of which the depth to which the needle is plunged can be regulated. These results are important as illustrating the success of a method of treatment which is exceedingly simple and requires no special manipulative dexterity. The only objection, however, that lies against the method, is that it involves a somewhat prolonged course of treatment, during which the patient is subjected to the presence of sloughing tissue, with its resultant fetid discharge, and disagreeable odor.

Evulsion was the method practised by the old surgeons, and is undoubtedly available in all cases where the growth has not attained to a very large size. It is, however, an exceedingly harsh method of treatment, and does not admit of any very nice surgical skill, and, moreover, it is open to other and very serious objections. Hemorrhage, not only during the development of the tumor, but even during measures for its removal, is always a very serious complication, and probably no method of treatment is liable to be attended by a greater loss of blood than that of evulsion. Injury to the soft parts and even to the bony structures during this method, also, may seriously complicate the operation. Furthermore, a recurrence is specially liable to take place after an operation by evulsion, partially on account of the fact that the whole growth is rarely removed by this method, and in addition to this, the harsh method of treatment stimulates the tissues to renewed morbid activity, although Hortoles<sup>2</sup> reports a case, in which the tumor was successfully extirpated in this manner, the growth having been removed in a large number of pieces at one sitting, the forceps being introduced, first through the mouth, and afterward through the nose, the manipulation being guided by the finger behind the palate.

<sup>1</sup> N. Y. Med. Record, May 14th, 1881, vol. xix., p. 557.

<sup>2</sup> Lyon Médicale, 1878, No. 34, p. 593.



The curette is rarely available for growths of the size to which these usually attain, in that its manipulations are notably hampered, although Menocal<sup>1</sup> reports a case, successfully treated in this manner, access to the growth having been obtained by a transverse incision, made with the galvano-cautery knife, through the palate, at the junction of the hard and soft portions, after which its attachments were separated, by means of a small, sharp, Volkmann's spoon.

Ligation is an exceedingly old method of treatment, and consists in tying a stout cord around the pedicle of the growth, and tightening it daily, until the whole growth sloughs away. This method of operating is open to the very serious objection, that the manipulation of a flexilbe cord, in such a manner as to place it successfully about one of these growths, even when the pedicle can be located, which is by no means always an easy matter, presents obstacles, oftentimes insurmountable, and when we consider the greater facility with which the cold steel wire can be manipulated for this purpose, and the greater advantages which it offers, it would seem that ligation is a method that should very rarely be resorted to, for the removal of these tumors.

Excision, by means of the knife, presents probably the most objectionable method of treatment of any that have yet been suggested, in that the violent hemorrhage which invariably attends this measure, not only greatly complicates the operation, but seriously endangers the life of the patient. Indeed, no small number of cases have been absolutely sacrificed in this manner, death occurring on the table.

The potential cautery, either in the form of the red-hot iron of the older surgeons, or in the form of the Paquelin cautery or galvano-cautery, is a method not to be recommended, in that the destruction of tissue is exceedingly slow, and an ill-smelling slough is formed, which renders the patient a source of offence, not only to himself, but to those about him.

Electrolysis in the treatment of fibromata of the naso-pharynx, suggested by Nélaton<sup>2</sup> in 1864, offers a very ingenious and attractive method of treatment, but it is still an unsettled question as to how far this method is successful. In a case observed by Nélaton,<sup>3</sup> a tumor of large size, which had been unsuccessfully subjected to other methods of treatment, was eradicated by electrolysis in six sittings. In a case reported by Bruns<sup>4</sup> also, of a young man,

<sup>1</sup> Revista de medicina y cirugía prácticas, Madrid, Dec., 1886.

<sup>2</sup> Gaz. des Hôp., 1864, No. 87, p. 345.

<sup>3</sup> Robin Massé: "Des Polypes Naso-Pharyngiens," Paris, 1864, p. 78.

<sup>4</sup> Berlin. Klin. Wochenschr., July 1st and 8th, 1872.

twenty-three years of age, in whom a fibroma had recurred after an operation by the *écraseur* three years previously, the growth was successfully eradicated by means of electrolysis, the treatment requiring one hundred and thirty sittings, at intervals of two or three days. Ciniselli<sup>1</sup> also reports a case of a tumor which filled the nasopharynx, and extended to both nares, as well as the mouth, and which was completely dissipated by a similar course of treatment, which extended over two years, the applications being repeated only once in three weeks. A case has been reported by Fischer<sup>2</sup> in which a cure was effected in six treatments, the needles being thrust through the soft palate into the growth, and the current allowed to pass for about twenty minutes. The first two applications were made within five days of each other, but the interval was afterward prolonged from one, to two and one-half weeks. Michel<sup>3</sup> reports having completely eradicated a growth in four cases, by this means, in respectively 53, 47, 90, and 47 sittings.

It would seem, therefore, that in this measure we have an exceedingly feasible means of eradicating these tumors, which is simple in its application, is attended with no danger, and ordinarily, with little discomfort to the patient, and which, therefore, would be especially applicable in those cases in which the general health has become so far impaired as to increase the hazard of a radical operation, or as even to render it absolutely unavailable. Unfortunately, however, we cannot expect these very satisfactory results by the use of electrolysis in all cases. Thus Lincoln<sup>4</sup> found it efficacious only in reducing the size of the tumor to such proportions as rendered a radical operation more feasible. This was also the experience of Paquet<sup>5</sup> as well as Ingals,<sup>6</sup> while in Gosselin's case, this method seemed not only to prove a failure in securing a reduction in the size of the tumor, but became so painful as to compel a change in the mode of treatment. This plan of treatment is carried out usually by means of long slender needles, attached one to the positive, and one to the negative pole of a galvanic battery of moderate strength. These are thrust deeply into the growth, one being inserted into the nasal prolongation, while the other is inserted through the mouth. Paquet noticed, in carrying out this manipulation, that dry gangrene occurred around the positive electrode, while moist gangrene set in about the negative electrode. Each sitting occupied from ten to twenty minutes and is to be re-

<sup>1</sup> Bull. Générale de Thérap., Paris, 1864, vol. lxvii., pp. 59-69.

<sup>2</sup> Wien. Med. Wochenschrift, 1865, No. 61, p. 1,113.

<sup>3</sup> Monatschr. für Ohrenheilkunde, No. 5, 1887.

<sup>4</sup> Loc. cit.

<sup>5</sup> Bull. de la Soc. Anat. de Paris, 1867, vol. xlii., p. 677.

<sup>6</sup> Jour. Amer. Med. Ass'n, Dec. 8th, 1888.

repeated in from about five to ten days, according to circumstances.

Where it is not convenient to insert both electrodes into the mass of the growth, the negative electrode may be inserted into the neoplasm, while the positive is attached to a sponge applied to the back of the neck, as was done by Ingals and Michel.

Undoubtedly the instrument which is best adapted for the removal of the larger proportion of these tumors, is the *écraseur* in some of its forms; and under this term, we may include the chain-*écraseur*, the wire-snare *écraseur*, and the galvano-cautery loop. This latter device was the one so successfully used by Lincoln, and it is the one preferred by many operators. The great advantage which this instrument is supposed to possess, is in the claim that by its use hemorrhage is avoided. This claim is undoubtedly true to a certain extent, and yet from a practical point of view, the galvano-cautery snare does not control hemorrhage to the extent which is claimed. The principle on which it operates is, that after the wire loop has been successfully disposed about the pedicle of the growth, it is drawn snugly into its position, when the current being closed, the wire is heated to a white heat, and the loop slowly contracted, burning its way through the pedicle. Now, as we know, a white heat does not control hemorrhage, although a red heat will do so; but the dense tissue of a fibroma is not easily burned through by a dull red heat, and I think most operators have learned, and certainly it has been my own experience, that the intenser heat is required for the operation. Hence, I question whether this method possesses any other advantage than a certain rapidity of operation. Furthermore, it is by no means an easy matter to manipulate this instrument. The placing of the soft platinum wire in position is by no means a simple procedure, and even after the pedicle has been grasped by the loop, the ordinary cautery-handle, with the *écraseur* attachment, is a somewhat bungling instrument to manipulate. Still further, I think it has been the experience of most of us in making use of this device, to find that the platinum wire is very fragile, especially when heated to a white heat, and that the operator is not infrequently put to great annoyance by the breaking of his wire, with the result, that all the difficult manipulation of putting it in place has to be undergone a second time. It has been recommended by a number of operators, to use the steel wire loop, in place of the platinum, in connection with the galvanic battery, on the ground that the wire possesses much greater tensile strength, is more easily manipulated and put in position on account of its rigidity, and that it is quite as easily heated for burning purposes as the softer metal. I have had no special experience in this direc-



tion, but certainly would suggest that its use might very greatly simplify the operation.

The cold wire snare, it seems to me, offers by far the best means of dealing with these growths, and of these instruments, perhaps none possesses the advantages of the Jarvis snare, although for this purpose, it should be of a larger and stouter construction than the one usually sold in the instrument-makers', under this name, and furthermore, the screw-nut should be composed of a bar, rather than a round disc. Jarvis, in his original description of his instrument, advised the use of No. 5 steel piano-wire. For fibroma, it is well to use one of the larger sizes. The great advantage of the steel wire, as already suggested, is that the loop possesses sufficient rigidity to enable the operator to carry it into the nasal passages, or into the pharynx, and force it over the tumor, as it were, even against considerable resistance; although, of course, if necessary this manipulation can be materially aided by means of the finger inserted into the pharynx, where it is designed to embrace the growth in that region. Still further, where the growth is of large size, and is composed of a number of prolongations or offshoots, it is often impossible to engage the whole mass by any device. Hence, with the steel wire loop, we may engage one prolongation, or one portion, at a single sitting, the procedure being simply to engage as large a portion of the mass within the circle of the wire loop as is feasible, when it should be drawn in, and slowly contracted, by means of the screw-nut. We thus largely avoid any hemorrhage, except such as may be excited by the manipulation, for we may occupy two or three hours, or even more, if necessary, in separating the mass, thus permanently closing the blood-vessels as we proceed.

In this procedure, we simply tighten the wire by two or three turns of the thread, every three or four minutes. When the growth is entirely cut through, the separated part comes away easily, when an additional portion may be attacked at the same sitting, or this deferred for another day, according as may seem wise. Of course, this manipulation is greatly facilitated by the use of cocaine, which should be applied as thoroughly as possible, by means of the spray, or by pledgets of cotton wrapped on the probe. In most instances, I think, it will be found feasible to conduct the whole operation through the nasal passages, since certainly the nasal prolongations can be best removed in this way, after which the pharyngeal growth can be attacked through the same channel, by the very simple device of fitting the *écraseur* with a loop sufficiently large to embrace the growth, when having drawn it well into the canula, this is passed through the nasal passages to the pharynx, after which the wire is forced out of the canula, when it immediately enlarges by its own

elasticity, into a loop of sufficient size to fit over the growth. By deft manipulation, this, without further aid, can be carried around the tumor in the pharynx, and fitted to the pedicle. If necessary the finger may be inserted behind the palate, in order to carry the loop to its proper place. When this is accomplished, the same manipulation as before suggested, of slowly contracting the wire, is gone through with. In this connection, the following case, treated in this manner, is of interest:

C. W. C., male, aged 13, consulted me January 16th, 1881, with the following history. For a number of years had been subject to a mild catarrhal disorder, but of a somewhat trivial character, and for which no treatment had been given. Early in September previously, there had set in a dark reddish discharge, evidently composed of bloody mucus, which lasted two weeks, in connection with nasal stenosis, followed by recovery from all the symptoms. Early in December, he commenced to complain of nasal stenosis again, in connection with the "dead" character to the voice. These symptoms gradually developed, until a week before I saw him, when he commenced to have violent attacks of epistaxis, which became so severe that I was called to see him, and found the source of the bleeding in a fibrous tumor of the naso-pharynx. On examination by posterior rhinoscopy, an irregularly rounded mass was seen, almost completely filling the upper pharynx, of a light, pinkish tinge, and coated with flakes of clotted blood. Digital examination showed the mass exceedingly hard and dense to the touch, and bleeding easily. I contented myself, for a fortnight, with the application of strong solutions of tannic acid, to control the hemorrhages, which occurred almost daily, and with apparent success, for on the 1st of February I was enabled to introduce the loop of a Jarvis snare through one nasal passage, and embrace a prolongation of the tumor, which projected into the posterior nares, within its lumen. This was slowly tightened, by giving a turn to the screw every few minutes, and the growth finally separated in two hours and a half, dropping into the pharynx, a mass perhaps the size of the last phalanx of the thumb. These operations were done before we had any knowledge of the use of cocaine, and hence were somewhat painful, especially the tightening of the loop—the boy wincing somewhat, every time the screw was turned. The piece was removed, however, with but a trivial loss of blood, and the patient dismissed. These operations were repeated on February 13th and 20th, March 6th, 13th, and 27th, on April 17th and 24th, and May 6th, pieces of varying sizes being removed at each sitting, in the same manner, and without any notable loss of blood, although always attended with more or less pain to the patient, resulting in the complete extirpation of the growth. These operations were all conducted through the nasal passages, with the exception of the last two, which were done with the curved snare shown in Fig. 136, passed through the mouth for the removal of the small remaining portions of the tumor. In no instance was it necessary to insert the finger in the pharynx, for placing the loop in position. An examination of the growth showed it to be composed of white, fibrous tissue, containing blood spaces and numbers of spindle cells, scattered throughout its substance (see Fig. 137). This boy, seven years later, showed no evidence whatever of return of the growth.

This case is of interest, as illustrating how the successful extirpa-

tion of a tumor of this sort may be accomplished in the ordinary course of office-practice, and without the aid of an anæsthetic, either local or general, although it is easy to perceive how much simpler the manipulation would have been rendered in the present day by the use of cocaine. I do not intend to suggest that the removal of these growths piecemeal is desirable. Certainly, we should in all cases endeavor to remove the whole mass at a single operation if possible, but where this is not feasible, I see no serious objection to removing the growth piecemeal, especially when this can be accomplished in so simple a manner as that above detailed. After all, each operator will select that method of procedure with which he is most familiar, and in which he is most skilful, and while not intending to entirely condemn the use of the galvano-cautery loop, it seems to me, that where one has familiarized himself with the manipulation of the cold steel wire, he will in most cases find it a preferable instrument with which to attack growths in the nose and nasopharynx. As regards the chain *écraseur*, the instrument which is usually associated in our mind with *écrasement*, I think no one in the present day will resort to so cumbrous a device, when we consider that the small steel wire possesses a tensile strength which is quite equal to the large jointed chain of the ordinary *Maisonneuve* *écraseur*. The only question which remains to discuss, is the advisability of measures for the prevention of recurrence. These consist essentially in the cauterization of the base, after removal of the growth. I know of no statistics bearing directly on this subject, and furthermore, it is one not easy to decide. A majority of operators, after removal of the tumor, cauterize the base. In a certain proportion of these cases the growths recur. Many cases have been reported in which the base was not cauterized, and in which there was no recurrence. If we eradicate these tumors at the age in which they usually present for treatment, namely from fifteen to twenty, we dismiss the patient, not only relieved from the tumor, but having outgrown largely the tendency to the development of this form of neoplasm. It, therefore, becomes exceedingly doubtful, whether cauterization has anything to do with the prevention of recurrence. Lincoln<sup>1</sup> lays special emphasis on this point, and seems to think that his repeated cauterizations of the base were entirely responsible for the fact that the tumors did not recur—a conclusion, perhaps, which cannot be established nor controverted. I think, however, that after the removal of any tumor, we should exercise a certain amount of conservatism, in subjecting healthy tissues to the action of caustics, whereby a renewed activity of morbid growth unquestionably in certain cases is stimulated. Is

<sup>1</sup> Trans. Amer. Laryngol. Ass'n., 1879, p. 255.



it not better to carefully watch the site of the growth, and be governed in our actions by the appearances of the stump, and to act only on the appearance of any indication of recurrence, being confident, that certainly in the majority of cases, this will not be discovered? As to the application of milder remedies, such as Lugol's solution, so highly recommended by Dauvergne,<sup>1</sup> or some of the milder caustics, such as acetic or chromic acid, I see no objection, although I think the potential cautery should be recognized, in this connection, as a device capable of doing mischief.

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<sup>1</sup> Bull. de Thérap., Paris, 1872, vol. lxxxiii, p. 499.

## CHAPTER XLIV.

### MYXO-FIBROMA OF THE NASO-PHARYNX.

THIS is a term which is used to designate a form of neoplasm, occurring in this region, which is composed of fibrous connective tissue, with a more or less copious admixture of myxomatous structure, and which, in consequence probably of the somewhat softer consistency which this admixture gives to the growth, results in the development of a tumor, possessing a clinical history entirely distinct from that of pure fibroma; and, furthermore, this distinction is still further emphasized by the fact, as clinical experience has shown us, that the myxo-fibromatous tumor springs from the upper portion of one of the oval openings of the posterior nares, where the mucous membrane lining the nasal cavity proper is merged into the structures which we find in the vault of the pharynx. True fibroma, fortunately, is a much rarer occurrence than the myxo-fibroma, for the former involves far greater danger, both to health and to life, than the latter; in fact, the softer tumor really exhausts its capacity for mischief, as a rule, in merely giving rise to a nasal stenosis, with a certain amount of difficulty in deglutition, and possibly some increase or perversion of the normal secretions. The frequency with which these growths occur, is scarcely to be estimated by the literature of the subject, in that undoubtedly large numbers of these cases are met with, in every-day practice, which present no symptoms or complications which would render them of sufficient importance for publication. Nevertheless, the number of cases which possess points of sufficient interest to warrant their being recorded, is by no means small. Thus we have reports on this subject by Gosselin,<sup>1</sup> Cutter,<sup>2</sup> Dumenil,<sup>3</sup> Panas,<sup>4</sup> St. Germain,<sup>5</sup> Trélat,<sup>6</sup> Labbé,<sup>7</sup> Coyne,<sup>8</sup> Linon,<sup>9</sup> Peltier,<sup>10</sup> Gangolphe,<sup>11</sup> and Chatellier.<sup>12</sup>

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<sup>1</sup> *Gaz. des Hôpitaux*, 1866, No. 39, p. 453.

<sup>2</sup> *Boston Medical and Surgical Journal*, 1870, No. 83, pp. 339-341.

<sup>3</sup> *Bull. de la Soc. de Chir.*, Paris, 1873, 3d Series, vol. ii., pp. 335-344.

<sup>4</sup> *Gaz. des Hôpitaux*, 1873, p. 861.

<sup>5</sup> *Ibid.*, 1874, No. 47, p. 66.

<sup>6</sup> *Bull. de la Soc. de Chir.*, Paris, 1874, 3d Series, vol. iii., pp. 557-560. And also, *Ibid.*, 1877, vol. iii., pp. 717-19.

<sup>7</sup> *Annal. des Mal. de l'Oreille*, Paris, 1875, vol. i., pp. 49-56.

<sup>8</sup> *Gaz. Hebdom. de Bordeaux*, 1880, vol. i., pp. 15 and 42. (Cases operated upon by Labbé.) <sup>9</sup> *Bull. et Mém. de la Soc. de Chir.*, Paris, 1881, New Ser., vii. pp. 480-482.

<sup>10</sup> *Annal. des Mal. de l'Oreille*, Paris, 1882, No. 8, pp. 179-181.

<sup>11</sup> *Lyon Médicale*, 1884, vol. xlv., p. 39.

<sup>12</sup> *Annal. des Mal. de l'Oreille*, 1886, pp. 473-481.

It is difficult to assign any direct cause for the occurrence of these tumors, although undoubtedly their development is influenced, in a manner not dissimilar from that which leads to the development of ordinary nasal polypi, in that they occur, not infrequently, in connection with myxomatous tumors, as was observed in the cases reported by St. Germain, Trélat, Peltier and Chatellier, the locality at which the morbid process has its onset seeming to dominate the character of the growth—the mucous polypi developing where the diseased process commences in the nasal cavity proper, the fibro-mucous polyp developing where the growth springs from the junction of the nose and naso-pharynx. Now, as we know, the one region is the favorite site for the development of fibroma, while the other region is the favorite site for the development of soft polyp or myxoma, the morbid process, therefore, at the junction of these two cavities gives rise to a neoplasm partaking of the characters of both. Sex seems to have a certain influence, in that about two-thirds of the cases reported occurred in females, thus, as it were, striking an average between the two forms, in that the fibroma seems to be almost exclusively a disease of males, whereas mucous polypus is of more frequent occurrence in females.

It is usually met with between the ages of fifteen and thirty, although apparently no age is exempt from the affection. Thus, Panas's case occurred in a man aged sixty-eight.

**SYMPTOMATOLOGY.**—In the early stages of the development of the growth, the symptoms to which it gives rise, consist merely of a certain degree of interference with nasal respiration on the side from which the tumor springs, with possibly some hyper-secretion. As the neoplasm increases in size, the nasal stenosis becomes more marked, and the voice is to a certain extent affected, in that the presence of the growth robs it, in part, of its normal nasal resonance. Owing to the presence of a large amount of myxomatous tissue in the tumor, its consistency is somewhat soft, and its development is comparatively rapid. Hence it very soon impinges upon the soft palate, interfering with its movements in phonation, thus giving rise to a very notable impairment, not only of the quality of the voice, but also in the clearness of articulation. Deglutition is not notably interfered with, in that the tumor is freely movable in the pharyngeal cavity, and is lifted by the movements of the palate during this act.

These growths may attain considerable size, without giving rise to any very marked symptoms of discomfort other than the interference with nasal respiration, although when their presence is discovered, they not infrequently become a source of mental distress, and anxiety to the patient. After it has found a somewhat firm



resting place on the upper surface of the palate, and the pedicle is thereby relieved from the tension of the pendulous mass, the growth seems to assume a lateral direction, and also in part to become arrested, in that its increase in size goes on with much less rapidity, and even shows a tendency to stop at this point. The tumor occasionally protrudes itself between the borders of the soft palate and the posterior wall of the pharynx, but it usually is thrown back again into the upper pharynx, by the ordinary movements of the palate, and rarely shows a disposition to permanently intrude itself

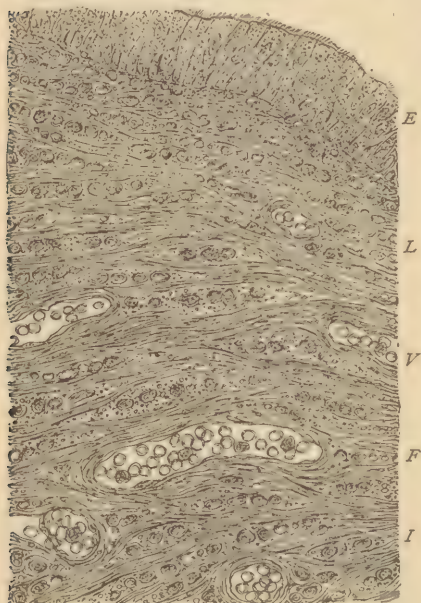


FIG. 138.—Myxo-Fibroma. *E*, Row of columnar ciliated epithelium; *L*, delicate fibrous connective tissue with numerous lymph-corpuses; *V*, blood-vessel; *F*, bundles of fibrous connective tissue in a reticular arrangement; *I*, interstices between bundles holding lymph-corpuses.

into the lower pharynx, although one of the cases reported by Coyne seems to have been of this nature, in that the lower border of the tumor rested almost on the root of the tongue. Epistaxis is never symptomatic of the fibro-polyp, although the ordinary faucial and bronchial symptoms which occur in connection with mucous polypi, may have their origin in a tumor of this character. Thus, in one of the cases which came under my own observation, spasmodic asthma seemed to be caused directly by the existence of the growth, in that it was entirely and immediately relieved by the successful removal of the tumor.

**PATHOLOGY.**—The essential basis-structure of the tumor is composed of bundles of white fibrous connective tissue, branching

and crossing one another in every direction, while scattered between the bundles of fibrous tissue, as well as between the individual fibres is found a large quantity of myxomatous tissue (see Fig. 138). In addition to this, there are numbers of fibres of yellow elastic tissue, scattered throughout the growth. The relative proportion, however, of these elements seems to vary in different parts of the tumor, in that the myxomatous tissue seems to dominate over the connective tissue in the central portion of the growth, while the converse is true as regards the peripheral portions, in that here the myxomatous tissue seems to diminish notably as we approach the surface, whereas the fibrous connective tissue increases. In

this portion of the growth, however, the yellow elastic tissue becomes more prominent in quantity, as compared with the white. In the outer portions of the tumor, and also scattered between the fibres, are found large numbers of round and spindle cells. The vascular supply is fairly rich in the central and peripheral portions of the tumor, while in the intermediate portions of the growth it seems to be to a certain extent deficient. Furthermore, it is notable, that the round-cell infiltration is greatest in the parts immediately about the peripheral capillaries. The pedicle is composed mainly of connective tissue. The tumor seems to be covered by the mucous membrane of the part from which it sprang, distended and somewhat attenuated, and covered by a number of layers of epithelium, the outer of which, in those parts not subjected to attrition or movement, is of the cylindrical ciliated variety, while in those parts which impinge upon the pharyngeal wall, the ciliæ are destroyed, and the cells have become somewhat flattened. The deeper layers of the epithelium are rounded or even flattened as we recede from the surface. The attachment of the growth is, in the large majority of instances, to some portion of one of the oval openings of the posterior nares, usually its upper portion; although in one of Panas's cases, and Trélat's cases, the attachment was to the septum, while Coyne's second case was quite unique, I think, in that the growth sprang from the inferior turbinated bone.

The pathological character of the growth would seem to lend ground to the view that in its origin it is an ordinary mucous polyp, which having fallen into the pharynx, and finding room for a larger development, attains simply an unusual size, while at the same time it becomes subject to irritation from the normal movements of the parts, resulting gradually in the development of a denser structure in its outer layers, composed more largely of connective tissue, for, as we have seen, the central portion of the tumor is composed to a great extent of myxomatous tissue. This view is furthermore supported in the fact that these tumors are met with so frequently in connection with the ordinary nasal polypi. Nevertheless, this idea falls to the ground, it seems to me, absolutely, when we remember that the neoplasm develops invariably from the margin of one of the posterior nares, a region from which, as far as I know, a pure myxoma has never been known to develop. We must regard, then, the tumor as developing primarily as a fibro-myxoma, and maintaining this character throughout its entire career, and simply explain this fact on the ground that it has its origin from a tissue which is the meeting ground of the nasal mucous membrane and the membrane lining the vault of the pharynx, two regions lined by mucous membrane differing in a marked degree in their histo-

logical and physiological characteristics, in one of which the prevailing form of growth is a myxoma and in the other of which the prevailing form of growth is a fibroma. Hence, a tumor springing from a region in which the structures of these two cavities commingle, necessarily partakes of the character of each, as first suggested by Panas.<sup>1</sup>

DIAGNOSIS.—Anterior rhinoscopy would scarcely avail for a definite diagnosis of these tumors, although undoubtedly in many cases they may be seen in this manner. With the rhinoscopic mirror in position, however, the rounded mass of the neoplasm should be easily brought into view, presenting a grayish-red aspect, of a muddy tinge, as it were, which is presented by no other form of growth met with in this portion of the upper air-tract. It should not be confounded with a true fibroid, in that a growth of this kind presents a whitish-pink tinge that is absolutely characteristic, whereas a myxo-fibroma is a grayish opaque tumor with very little of the reddish hue which is met with in connection with a high degree of vascularity. In addition to this, the insertion of a probe will easily demonstrate the mobility of the growth, and render the diagnosis free from all obscurity. If any doubt should remain as regards the character of the tumor, the insertion of the index finger would prove sufficient to clear this up. It scarcely seems possible that a growth of this kind should be mistaken for a fibroma, when we consider its immobility, the high degree of vascularity, together with the almost invariable occurrence of attacks of epistaxis met with in connection with the one, and the freely movable character, and the absence of vascularity of a myxo-fibroma, and yet Dumenil performed temporary resection of the superior maxilla for a case of this kind, under the impression that he had to deal with a true fibroma, which would suggest that there may be occasionally serious difficulties in diagnosis in these cases. It should be stated, however, that Dumenil's case was a boy eight years of age, and therefore the diagnosis presented difficulties much less easily overcome than in the case of an adult. When the growth presents below the palate, and is brought under immediate ocular inspection, the diagnosis of course presents even less difficulty than when it is beyond the line of direct vision. In addition to this, it might be borne in mind, that a fibro-mucous tumor never gives rise to hemorrhage, facial deformity, displacement or erosion of bone, or any of the grave complications which attend the development of fibroma in the naso-pharynx.

PROGNOSIS.—As before stated, these growths develop somewhat rapidly at first, while subsequently their growth seems to be-

<sup>1</sup> Loc. cit.



come notably retarded, or even shows a tendency to arrest, although as regards any tendency to a retrograde process or atrophy, as sometimes occurs in fibroma, this, I think, has never been observed, nor, as far as I know, has there ever been observed any disposition to their spontaneous separation or a sloughing away. As regards life, however, or any serious danger to the general health, the prognosis is quite favorable, as the procedures by which they are removed, present, at the present day, no very great difficulties, and are attended with no grave dangers. After removal they occasionally recur, although this tendency is by no means as marked as in the case of myxomata.

TREATMENT.—These growths being pendulous in the pharyngeal cavity, and attached by a pedicle usually not larger than three-eighths to a half inch in diameter, their successful removal presents no very serious or great obstacles. If they hang below the border of the soft palate, perhaps the simplest method of extracting them, is to seize the pendulous portion by a stout pair of forceps, the blades of which are armed with teeth of sufficient size to prevent the tumor escaping from its grasp, when the whole mass is separated by twisting the forceps in the hand, until the tumor comes away. This process of course is much better than simply tearing the growth away, in that by this means the separation is accomplished at its attachment, whereas simple avulsion might result in unnecessary injury to healthy parts. It is not always feasible, however, to extract these growths by torsion, on account of their size, hence in order to facilitate the manipulation, and to provide more room, it may be necessary to make an incision in the palate, as was done by St. Germain, Panas, and Labbé. Of course, by this procedure, a much ampler access is obtained, either for torsion or such other method of operation as may be determined upon. The peculiar shape of the growth would seem to suggest, as the most rational method of operating, the use of the snare or *écraseur*, and undoubtedly this is the device which should be selected in all cases where feasible, in that it assures the separation of the growth at the pedicle, and with the least injury to healthy tissue. The main difficulty here, however, consists in the adjustment of the loop. Linon<sup>1</sup> made use of a rather ingenious method of adjusting his loop, as follows: A Bellocq canula was passed through the nose into the oral cavity, when the ends of the wire were drawn back, leaving the loop in the mouth. A thread was then inserted into the pendulous portion of the tumor by means of a curved needle, and dropped through the loop, traction being exerted on the thread and subsequently on the wires emerging from

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<sup>1</sup> Loc. cit.

the nose. The loop in the fauces necessarily was made to pass up over the growth, and to adjust itself to the pedicle, whereupon the tube was slipped over the wires emerging from the nose and the pedicle severed by *écrasement*. Of course, in these cases, the chain *écraseur* is altogether too cumbrous an instrument. Most operators unquestionably nowadays will prefer the wire snare *écraseur*, constructed on the principle of Jarvis's snare. An instrument of this kind, armed with a steel wire, supplies a loop, which in the hands of an operator of moderate manipulative skill, can be passed through the nasal cavity, and slipped over a growth even of considerable size without the aid of Linon's ingenious method. The snare being adjusted with a loop that can be passed through the nostril, is carried through the nose to the pharynx, when by turning it in such a manner as to bring the loop in a horizontal position, the wire is played through the tube, when the loop, on account of the highly elastic character of the wire with which it is mounted, enlarges in the pharynx sufficiently to admit of its being carried up over the growth, by the simple manipulation with one hand. No doubt, this may not be accomplished at first, but a few trials, I think, in most cases, will enable the operator to put his loop in position in this manner, although, of course, additional aid if necessary can be obtained, and the placing of the loop in position assured, by passing the finger behind the palate, catching the loop, and carrying it into position.

But three cases of this kind have come under my own observation, in all of which the growth was extirpated by this means, nad with comparatively little trouble. Of these three cases, two happened to come under my observation before the introduction of cocaine, and the operation was in all cases done without either local or general anæsthesia. The importance of using local anæsthesia in these operations need scarcely be mentioned, nor the very great aid which it renders both as anæsthetizing the parts, and contracting the blood-vessels of the nasal membrane, thus providing a larger cavity through which the manipulation may be accomplished. I should regard the steel wire *écraseur* as more feasible and in every way preferable to the use of the galvano-cautery *écraseur*, in that the instrument is lighter, simpler, and more easy of manipulation. The galvano-cautery loop is by no means so easy of adjustment, although it presents the possible advantage of cauterizing the base. I question, however, if this latter is a matter of any great importance, as fortunately these tumors show but little tendency to recur when thoroughly extirpated, and it is an open question, whether even cauterization of the base retards this tendency in any degree.

## CHAPTER XLV.

### CHONDROMA OF THE NASO-PHARYNX.

OUR knowledge of this rare disease is based entirely on the records of two cases, the report of which is appended in sufficiently full detail to afford all necessary information as regards its clinical history, prognosis, and method of treatment.

CASE I.—Max Müller<sup>1</sup> reports having observed a case of enchondroma of the naso-pharynx in a young man, aged 29, who gave the history of a tumor of this region which had commenced some five years previously, and which at its onset giving rise merely to nasal stenosis without secretion, developed by a somewhat slow process, gradually filling up the naso-pharynx, and sending prolongations into both nares, while at the same time it extended down to the level of the soft palate, which was crowded forward into the oral cavity.

The subjective symptoms consisted mainly of headaches, which were of a very severe character, coming on in paroxysms, and lasting from two to four days. Later he became subject to attacks of syncope, due, probably, to disturbance of the cerebral circulation.

Access to the part was obtained by means of Langenbeck's operation of temporary resection of the superior maxilla, and the tumor successfully removed by means of the *écraseur*. Examination revealed it to be an enchondroma which had its origin from the basilar process. The operation was entirely successful, and there was no history of recurrence.

CASE II.—Heurtaux<sup>2</sup> cites a case of a young girl, who for five years had suffered from gradually increasing nasal stenosis, first of the left side, and later of the right. In connection with these, there then developed exophthalmos, amaurosis and broadening of the dorsum of the nose, giving rise to a certain amount of facial deformity. Examination showed the right nasal fossa to be closed by a deflection of the septum, the result of a tumor in the left nares, impinging upon it. The finger introduced behind the palate discovered a hard, dense tumor filling the naso pharyngeal space. In spite of the firmness of the growth the exploring-needle penetrated it easily. An operation for its removal being decided upon, access to the growth was gained by the removal of the left half of the nose. The tumor was found adherent to the floor of the nasal cavity, to the septum, and to the posterior pharyngeal wall, and had invaded also the antrum. Microscopic examination showed the growth to consist almost entirely of hyaline cartilage. The patient made a rapid recovery.

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<sup>1</sup> Arch. für Klin. Chirurg., vol. xii., p. 323.

<sup>2</sup> Bull. de la Soc. Anat. de Nantes, Paris, 1879, Séance 21st Feb., 1877, p. 30.



## CHAPTER XLVI.

### SARCOMA OF THE NASO-PHARYNX.

MALIGNANT disease having its origin in this region would seem to be of exceedingly rare occurrence. Of the two forms, sarcoma is met with much more frequently than carcinoma. And yet in either form, medical literature contains the reports of such a limited number of cases, that a brief resumé of each of these is given.

CASE I.—Cited by Brevet. The patient was a female, 50 years of age, who had always enjoyed good health until the cessation of the catamenial flow, at the age of 48. At this time, she developed symptoms of a naso-pharyngeal tumor, which gradually occluded the posterior nares, giving rise to nasal stenosis, difficulty in deglutition, and dead voice. In addition to this, there was considerable pain in the left side of the head. The patient became entirely deaf in the left ear, and the hearing on the right side was much impaired.

The interference with deglutition and respiration was increased by the fact that the motions of the lower jaw were impeded, on account of a rheumatic ankylosis of the left temporo-maxillary articulation; and at last the patient sought surgical advice. At this time she was found to be suffering from a tumor, situated in the pharyngeal vault, to the left of the median line, and almost completely occluding the left posterior nares; the tumor was adherent to the soft palate as well as the posterior pharyngeal wall. The growth was removed after extirpation of the left superior maxilla. The patient recovered from the operation. The further history is not given.

A microscopic examination showed the growth to be a sarcoma, made up of oval cells for the most part, with an admixture of round and spindle cells, together with some white fibrous and yellow elastic tissue. The growth was not encapsulated, and the demarcation between healthy and diseased tissue was ill defined.

CASE II.—Reported by Bryk.<sup>2</sup> A male, aged 24, presented with the history of a naso-pharyngeal tumor, dating back for a number of months, and which in six months past had attained such proportions as to project into the lower pharynx, and crowd the palate forward into the oral cavity, giving rise to nasal stenosis and difficulty in deglutition, with marked impairment of the general health. For three months there had been severe attacks of dyspnoea, which compelled the patient to maintain the sitting posture. When first seen, the tumor extended down to the level of the larynx, and was of a somewhat dense and elastic nature. There was total deafness, although no evidence of further extension was shown by facial deformity or other symptoms. Preliminary

<sup>1</sup> Thèse de Paris, 1855, No. 117, p. 36.

<sup>2</sup> Wien. Med.-Halle, 1862, vol. iii., No. 33, pp. 311, 320 and 328.

tracheotomy was done, and the growth removed by means of the galvano-cautery snare eight days later, followed by death at the end of twenty-one days from erysipelas. The tumor was a spindle-cell sarcoma, of a medullary character.

CASE III.—Reported by Verneuil.<sup>1</sup> Verneuil reports a case, occurring in a female, aged 40, who presented with a faucial tumor, which had existed for three months, and which latterly had given rise to notable symptoms of difficulty in deglutition, and gastric disturbance, together with some dyspnoea. In addition to these, there was tumefaction of the right side of the neck. Faucial examination revealed the existence of a growth, about the size of a hen's egg, crowding the palate forward, and projecting into the lower pharynx. There was also exophthalmos, convergent strabismus, deafness, and facial paralysis of the same side. Headache was also a prominent symptom. No operation was attempted in this case, and the patient died two months later, as the result of pulmonary congestion. Examination showed that the tumor, which having its origin from the sphenoidal apophysis, had invaded the basilar process, and extended down the lateral wall of the pharynx, and finally made its way into the external tissues of the neck. The brain cavity was also invaded, by extension from its primary point of origin.

CASE IV.—Reported by Neureuter.<sup>2</sup> Neureuter reports the case of a boy, aged 8, who presented with a history of a tumor of the naso-pharynx, which had first manifested itself two years before, and which had assumed such proportions as that it completely filled the naso-pharynx, and protruded into the oral cavity, crowding the palate forward. There was very marked impairment of general health, with difficulty of swallowing, and attacks of dyspnoea. No radical operation was attempted, but pieces were removed by various methods, simply as a palliative measure. One month later, tracheotomy became imperative, and the patient died at the end of another month, the tumor having made its appearance in the neighborhood of the parotid gland externally. The cause of death was inanition. The tumor is reported as sarcoma, although the special characteristics are not given. Autopsy revealed that it had its origin in the naso-pharynx, and successively invaded the nasal passages, the orbit, and made its exit upon the cheek, through the pterygo-maxillary fissure.

CASE V.—Reported by Boeckel.<sup>3</sup> A boy, aged 19, presented with the history of nasal symptoms, dating back two months, giving rise to nasal stenosis, a moderate discharge of foul pus, streaked with blood, together with considerable neuralgic pain, referable to the right side of the face. An examination revealed the pharynx occupied by a rose-colored tumor, of considerable size, which extended down to the border of the soft palate, which was crowded forward into the oral cavity. There was also some impairment of the general health. Temporary resection of the superior maxilla was done, and the tumor extirpated, which was found to have its origin in the basilar process of the occipital bone. The growth was found to be sarcoma. The operation was successful, but erysipelas supervened from which the patient recovered. Death occurred, a month after the removal of the growth, with pulmonary symptoms. An autopsy showed generalization of the disease, large masses of sarcomatous tissue being found in the lungs.

<sup>1</sup> Bull. de la Soc. Anat., 1867, p. 256.

<sup>2</sup> Wien. Med. Presse, 1871, xii., p. 590.

<sup>3</sup> Gaz. Méd. de Strasbourg, July 1st, 1872, No. 2, p. 18.

CASE VI.—Reported by Demarquay,<sup>1</sup> who removed from a woman, aged 48, a naso-pharyngeal growth, which recurring three months later, led her to seek his advice again, when he discovered that the tumor had not only recurred, but had now filled the naso-pharynx, and extended into the antrum. Somewhat against his judgment, he operated by the removal of the upper jaw, but before the operation was completed, the patient died on the table, from suffocation, blood having entered the trachea and bronchi. The autopsy revealed the neoplasm to be sarcomatous in character, its origin being reported as from the third and fourth cervical vertebrae, although it seems probable that this was merely an extension of its primary site from the basilar process, in much the same manner as occurs in fibroma, as suggested by Nélaton.

CASE VII.—Reported by Veillon.<sup>2</sup> A male, aged 14, presented the following history: Two months previously he commenced to suffer with severe pains in the pharynx, followed soon by indications of the existence of a tumor in that region, which gave rise to impairment of function and voice. The pains increased in severity, and were marked by nocturnal exacerbations. There was no hemorrhage at this time, although subsequently this became a very prominent symptom. When first seen, the growth had attained considerable size, giving rise to external facial deformity, exophthalmos, and protruded into the pharynx in such a manner as to crowd forward the soft palate, while at the same time respiration was notably interfered with. There was no secondary glandular infiltration. An operation was commenced by Verneuil, consisting of resection of the nasal bones, with a portion of the superior maxilla. A piece of the tumor was examined during the operation and discovered to be a sarcoma; further procedure was abandoned. The patient subsequently developed evidences of generalization of the sarcoma, as shown by polyuria and hæmaturia, and died three months after the first symptom manifested itself, having developed well-marked brain symptoms. An autopsy showed that the tumor, having its origin in the basilar apophysis, had successively invaded the nasal cavity, orbit, the zygomatic fossa, and the anterior part of the base of the brain, and also had made its appearance in the thoracic and abdominal viscera.

CASE VIII.—Reported by Marjolin.<sup>3</sup> A female, aged 41, presented with a history of a tumor in the naso-pharynx, which had existed for a year, and which finally gave rise to difficulty in swallowing, with obstruction to nasal respiration. There was also a notable amount of infiltration of the cervical glands. There seems to have been considerable hesitancy as regards the diagnosis, and the patient was subjected to general medication, in spite of which the tumor continued to enlarge, until it had crowded forward the soft palate, and even displaced the hard palate, extending as far as the anterior dental arch. The general health became very greatly impaired, partially as the result of mal-nutrition, on account of the difficulty in swallowing, and partially as the result of the general influence of the growth. Hence, no operation was attempted, and the patient succumbed two months later, from suffocation from the passage of food into the air tract, owing to her inability to swallow. An autopsy showed that the growth, having its origin in the basilar process, had successively invaded the pharynx and nasal cavities, and had also involved the glandular structures of the neck. The basilar process, and the sella turcica were completely destroyed, although the dura mater was found intact.

<sup>1</sup> *Gaz. des Hôpitaux*, 1873, p. 805.

<sup>2</sup> *Thèse de Paris*, 1874, No. 463.

<sup>3</sup> As cited by Veillon, *loc. cit.*, p. 27.



There seems to have been some question as to the character of this tumor, although Veillon reports it as an undoubted sarcoma.

CASE IX.—Reported by Veillon.<sup>1</sup> Veillon reports a second case, as having occurred in Nélaton's service, of a young man, aged 17, in whom a tumor had developed in the naso-pharynx, and subsequently gave rise to exophthalmos, and atrophy of the optic nerve. An operation was done, and that portion of the growth within reach, removed. This was followed by a marked improvement of the symptoms for a few weeks, after which the patient succumbed to invasion of the brain.

This case was reported by Nélaton as a naso-pharyngeal growth, but is reported by Veillon as sarcoma.

CASE X.—Reported by Eppinger.<sup>2</sup> He reports the results of a necropsy, in a male, 45 years of age, who had suffered with sarcoma of the pharynx. The growth arose from the pterygoid process of one side, and extended downward along the inner surface of the right ramus of the inferior maxilla, and along the left side of the bodies of the cervical vertebræ.

The growth also extended in an upward direction, and broke through the base of the skull, invaded the ethmoid, and partially filled the right middle fossa of the skull, so that the brain was compressed, and the convolutions flattened. The neoplasm was an alveolar sarcoma.

CASE XI.—Reported by Deprés.<sup>3</sup> A case of a male, aged 36, who showed symptoms two months previously of a commencing tumor in the naso-pharynx, which gave rise to some nasal stenosis, which when first seen, had developed to the extent of completely filling this cavity, projecting into the lower pharynx, and crowding the palate forward into the mouth. There was considerable difficulty in deglutition, but no impairment of general health. The cervical glands were slightly enlarged, although this may have been due to the insertion of a seton, which had been made some months before. Deprés proposed to extirpate the tumor, after an incision through the palate, but no further report is given.

CASE XII.—Reported by Schmid.<sup>4</sup> A case of myxo-sarcoma, occurring in a female, 48 years of age, with no hereditary history of malignant disease. She presented with the history of having been troubled for about a year with naso-pharyngeal catarrh, with nasal stenosis, and severe epistaxis, and a feeling of oppression in the naso-pharynx. There was difficulty of deglutition, and the foul discharge from the tumor, both into the nose and throat, had seriously interfered with the nutrition of the patient. The growth had attained such a size at the time of examination as to interfere with respiration, and to be visible below the border of the soft palate. It was apparently pedunculated, and appeared to arise from the vault of the pharynx.

Gussenbauer's operation was performed, and the growth was found to invade the left antrum, but was thoroughly extirpated. Three weeks after this there was a recurrence which necessitated the extirpation of the superior maxilla. Several operations followed, at short intervals, for recurrence, until finally the tumor had evidently involved the base of the skull, beyond the reach of operative interference. A microscopic examination proved the growth to be a myxo-sarcoma.

<sup>1</sup> Loc. cit.

<sup>2</sup> Vierteljahresschrift für prakt. Heilk., 1875, No. 2, p. 8.

<sup>3</sup> Revue de Thér. Méd-Chir., 1877, p. 283.

<sup>4</sup> Prag. Med. Wochenschr., 1881, vol. vi., p. 274.

CASE XIII.—Reported by Weir.<sup>1</sup> Weir reports the case of a boy, aged 8, who presented with the history of nasal stenosis, and discharge, dating back one year, for which he had been subjected to several plans of treatment, without avail, the symptoms being due to a tumor in this naso-pharynx, which when first brought under observation, completely filled this cavity, and sent prolongations into the nasal passages of both sides, and at the same time projected into the lower pharynx, and crowded the palate forward into the oral cavity. Access to the tumor was obtained by Nélaton's operation, of resection of the hard palate, without preliminary tracheotomy. This, however, became necessary during the operation, on account of the entrance of blood into the trachea. The operation was finished, and the growth removed, but the patient died almost immediately upon its completion. Examination showed the growth to be a fibro-sarcoma, springing from the basilar process of the occipital bone.

CASE XIV.—Reported by Burnett.<sup>2</sup> A case of a physician, 45 years of age, suffering from sarcoma of the pharyngeal vault, in whom the first symptom which attracted the patient's attention, was steadily-increasing deafness, chiefly in the left ear, together with autophony, and a sensation of fluid in the tympanic cavity. Examination revealed fluid in both tympanic cavities, and paracentesis was done, with relief of the symptoms, although the procedure had to be frequently repeated, as the fluid re-accumulated rapidly. In addition to the aural symptoms there developed some nasal stenosis, and pain in the back of the neck. The patient also began to emaciate. Close questioning elicited the fact, that almost a year before, he had suffered from several attacks of epistaxis, and from this time on the nasal intonation became noticeable.

Examination revealed a hard tumor, about the size of a chestnut, on the left side of the pharyngeal vault, close to the left choana; a fragment scraped off, and subjected to a microscopic examination, was found to be made up of small round cells. The patient refused operative interference, and finally died, four and one-half months after he was first seen, from inanition, the tumor interfering seriously with deglutition, and also with some evidence of cerebral involvement. There was no autopsy.

CASE XV.—Reported by Lincoln.<sup>3</sup> A case of a boy, aged 16, who presented with the history of nasal stenosis, dating back nearly three years, in connection with which he suffered from repeated attacks of epistaxis. On examination, a growth was found, apparently springing from the vault of the pharynx, and more or less completely filling that cavity, while at the same time a prolongation extended into the right nasal passage. The general health was notably impaired. The removal of the growth by the galvano-cautery was decided upon, and with this design, the wire loop was carried through the nasal passage, by means of a double canula, and subsequently adjusted around the growth, with the aid of the index finger passed behind the palate. The separation of its attachment was successfully accomplished, when the whole growth came away through the mouth. The mass weighed 2¼ oz., the cut surface measuring 2 inches by 1¾. An histological report of the case, by Dr. George R. Elliott, showed it to be a fibro-sarcoma, the fibrous tissue predominating. This case is interesting, as illustrating the exceeding slowness with which a tumor may develop, and also a notably successful operation, by means

<sup>1</sup> New York Med. Record, June 3d, 1882, p. 607.

<sup>2</sup> "A Treatise on the Ear," Phil., 1884, p. 437.

<sup>3</sup> New York Med. Record, Oct. 25th, 1884, p. 455.

of the galvano-cautery *écraseur*. It is unfortunate, however, that no further report was obtainable, in that the patient disappeared from observation.

CASE XVI.—Reported by Massei.<sup>1</sup> A case of a young man, aged 18, in whom a sarcomatous tumor developed in the naso-pharynx, which at the end of two years had grown to a large size, completely filling the cavity, and extending into the lower pharynx, crowding the soft palate forward into the mouth. The prominent symptoms were pain, epistaxis, difficult deglutition, dyspnoea, complete loss of the sense of smell, and deafness. There was an offensive discharge, with notable impairment of the general health. Its removal was successfully accomplished by means of the galvano-cautery *écraseur*, the loop being placed in position with the aid of a Bellocq's canula and the index finger in the fauces. No further history of the case is given.

CASE XVII.—Reported by Annandale.<sup>2</sup> A young man, aged 20, was suffering from a large growth in the naso-pharynx, which, arising from the base of the skull, had crowded the soft palate forward and become adherent to it. The growth had attained such a size as to obstruct respiration, and operative interference became necessary. A preliminary tracheotomy having been done, Annandale performed his operation of separation of the superior maxillæ, the soft palate having also been divided in the median line. The growth was removed with forceps, and the patient recovered from the operation, but the growth recurred. It was found, upon microscopical examination, to be a sarcoma.

CASE XVIII.—Reported by Bryant.<sup>3</sup> This case is interesting, from the rather novel procedure adopted for its control, and the success which attended it. The patient was a male, 22 years of age, who, since 1884, had been conscious of nasal obstruction of the left side.

About a year later, portions of a growth were removed with forceps: from that time until May, 1888, portions were removed from time to time, with the snare or forceps. The microscope showed the tumor to be a myxo-sarcoma. The patient grew steadily worse, and had several severe hemorrhages which weakened him very much. In May, 1888, the growth was causing severe pain, due to pressure, the hard and soft palates were displaced, and the tumor completely filled the pharyngeal vault, causing complete stenosis.

On June 19th, both external carotids were tied, and at the end of a week the neoplasm had diminished very much in size from the procedure. A few days later, the superior maxilla was excised. The subsequent treatment consisted in removing portions with the snare, and also by the injection of strong carbolic acid, which caused a sloughing away of portions of the neoplasm. These injections were soon abandoned, on account of the pain which they caused. From this time no treatment was pursued, and the growth has continued to decrease in size, and has ceased to be a source of annoyance. The operator believes that the improvement has been almost entirely due to the ligation of the carotids cutting off the blood-supply to the tumor.

All of the above cases seem to have been rounded masses, forming in many cases encapsulated growths. The following case, which came under the care of the author,<sup>4</sup> seems somewhat unique,

<sup>1</sup> *Archivii Ital. di Laringologia*, fasc. iii., 1887.

<sup>2</sup> *Lancet*, Jan. 26th, 1889, p. 162.

<sup>3</sup> *N. Y. Med. Journal*, May 11th, 1889.

<sup>4</sup> *New York Medical Record*, Jan. 17th, 1885.



in that it was a case, which starting in the naso-pharynx as a distinct tumor, subsequently became a diffuse sarcoma, which successively invaded and infiltrated the tissues of the soft palate, right pillar of the fauces, tonsil, and the mucous membrane lining the lower pharynx. It is of still further interest, with reference to the method of treatment, and the ultimately successful cure of the disease.

CASE XIX.—J. T. H——, aged 42, a gentleman prominent in public life in one of our Western States, consulted me on June 26th, 1882, at the request of Dr. Henry Evans, of Sedalia, Mo., giving the following history: When a child he fell, receiving a blow upon the nose which resulted in a deflection of the septum by which the right naris became almost completely occluded. This caused but little annoyance in early life, but for several years he had been much troubled with an ordinary nasal catarrh. During the spring of 1882 he was under treatment for this, but with no marked relief. About February 15th, 1882, his physician discovered a tumor in the vault of the pharynx, which he regarded as a glandular hypertrophy. The patient, however, had been conscious of a fulness in this region for some months previously, and had at the same time been conscious of an increasing faucial secretion. Local treatment was applied to this for about two months, until April 13th, when a portion was removed with the forceps, which upon examination was pronounced benign in character.

He went to Missouri about May 1st, remaining six weeks. While in Sedalia, early in June, Dr. Evans saw him, and after a careful examination of the growth pronounced it malignant, and advised him to come immediately to New York. I might mention in this connection, that on his way to New York he saw Dr. William Porter, of St. Louis, and Dr. Cohen, of Philadelphia, who regarded the growth as malignant, and gave an unfavorable prognosis.

By this time the discharge from the tumor had become exceedingly fetid and offensive, and considerable in amount. His general health also had become markedly impaired.

On June 26th he came to my office. At that time he was in an exceedingly enfeebled condition, the walk to my house, and the climbing my steps causing him considerable effort. He was noticeably emaciated, the skin of a sallow, unhealthy color, the pulse 120, and temperature 101°. On examination of the fauces there was noticed a brownish, unhealthy-looking discharge from the pharyngeal vault, which gave forth an exceedingly unhealthy odor. The soft palate was of a dark-red, mottled appearance, especially on the right half, and seemed to be crowded forward by a growth behind it. By palpation, a hard dense mass was felt, of a rounded and slightly irregular outline, which seemed to fill the pharyngeal cavity and extend down to the edge of the soft palate. On lifting the velum with a probe, the lower edge of the mass was brought into view, of a pale pinkish color, and pultaceous aspect. The palato-pharyngeal space was completely blocked up. Protruding between the growth and the palate were a number of blackened shreds of necrosed tissue.

The whole aspect of the case was most discouraging, as I felt convinced that the tumor was malignant. Furthermore, any question of a radical operation was not to be thought of, his general condition being such, that I had little hope of his surviving such a procedure. The plan of treatment that I decided upon, was to remove the tumor piecemeal, taking off small masses at

a time, and in such a manner that all shock to the system should be as far as possible avoided. This was accomplished by means of the wire snare *écraseur*, the instrument I used being the curved modification of Jarvis' snare seen in Fig. 136. The snare being mounted with No. 5 piano wire, a small loop was arranged, and pressed upon a small portion of the border of the growth, and the screw being turned, the loop would bury itself in the soft tissue, and in this manner, a portion perhaps not larger than a split pea, would be taken off.

In this manner, several small pieces were removed the first day I saw the patient. Immediately on cutting off a piece of the tumor, the parts were showered with a weak solution of borax and carbolic acid, until all pain and irritation were allayed. In this manner I operated every day, removing small portions successively, until my patient was too much wearied to proceed.

A piece of the growth was sent to Dr. William Welch, who reported on June 30th: "The specimen consists of a number of fragments, the largest the size of a small bean. Their consistency is rather soft. After hardening with alcohol, sections were prepared and examined microscopically. The surface of the specimen is covered with laminated flat epithelium. Beneath this, the new growth begins at once. This new tissue is composed of lymphoid cells, chiefly, between which is a reticulum of anastomosing fibres. In addition, there are some fusiform and branching cells, and here and there giant cells, the nuclei of which are mostly in the centre of the cell. The structure is therefore like that found in lymphatic glands, and called lymphatic or adenoid tissue. There is no alveolar arrangement to be observed. The growth is therefore a sarcoma. The main features are those of lympho-sarcoma, but the type is somewhat mixed, by the presence of the giant cells."

From June 26th to July 12th, I saw him daily, and operated as above, removing a number of pieces. His condition at this time became somewhat alarming. His strength was failing, and he was suffering much from neuralgia of the face. I therefore sent him to the sea-shore near the city, where I could continue my daily attendance. A few days at the sea-shore seemed to revive him greatly.

By July 16th, I had removed a considerable extent of the lower portion of the growth, and now came upon a large necrotic mass, embedded in the growth, which I was enabled to remove. This was about the size of a walnut, and seemed to be a superficial slough, the result of pressure exerted on the surface of the tumor, the different lobes, as it were, growing from the sides of the pharynx, and crowding upon each other. With the removal of the slough, the neuralgic pain was relieved, the fetid discharge and offensive odor disappeared, and in every way his general health improved. He had evidently been suffering all this time with a mild septicæmia, the result of absorption from this necrotic mass.

July 23d.—The parts from which the growth had been extirpated were cauterized with the galvano-cautery, resulting in some inflammatory reaction, which compelled me to desist from operative measures for several days.

July 30th.—The growth is so far cleared away, that its extent can be seen involving the whole of the upper pharynx, and its lateral walls, surrounding the Eustachian orifices of each side, and forming a fringe, as it were, about each posterior naris, but not extending into the nasal cavities. There was also found to be a long fusiform mass, extending along the upper surface of the soft palate, from the right side of the uvula to its junction with the hard palate. His general condition was now everything that could be desired, and rapid progress was made in removing the growth. I might add here, that the

loop was placed in position in the pharyngeal vault by means of the rhinoscopic mirror, the patient holding the spatula in one hand, and drawing forward his palate by a palate-hook with the other. The galvano-cautery was again used over the surface operated upon, followed by inflammatory reaction, not very well marked, however.

August 4th.—Galvano-cautery used.

August 8th.—Returned to the city; doing well.

August 15th.—Galvano-cautery; considerable reaction.

August 27th.—Galvano-cautery used; reaction very marked, so much so that the operation had to be given up for several days.

At this time I sent a specimen of the growth removed from the vault of the pharynx to Dr. Charles Heitzman for examination. His report was as follows: "Numerous medullary corpuscles, greatly varying in size and shape, some nucleated, others coarsely, others, again, finely granular, are closely pasted together, and separated from each other by scanty cement-substance, or fibrous basis-substance. The blood-vessels traversing the tissue are very scanty. Diagnosis: round-cell sarcoma, or globo-myeloma of a very malignant type. Tumors of this kind, after extirpation, almost invariably recur, and within a few months or years cause a fatal termination."

September 9th.—Galvano-cautery used, and following this there was a very marked aggravation of all the symptoms; the growth on the soft palate assumed an angry and threatening aspect.

September 12th.—The growth on the soft palate extended through the palate and down on the right tonsil and anterior pillar of the fauces. I now removed a number of pieces from the soft palate and tonsil.

September 20th.—There appeared a new centre of development in the lower pharynx, and on September 25th, it had so far extended, that it now involved the right half of the oro-pharynx, down to the level of the epiglottis, the right tonsil, the right anterior pillar of the fauces and a portion of the soft palate, part of the palate having been removed. There was also a considerable portion of the growth remaining in the pharyngeal vault. The whole aspect of the case was most discouraging.

Dr. Frank H. Hamilton and Dr. Beverley Robinson now saw the patient with me in consultation, and both expressed the opinion which I entertained, that the case was hopeless.

I felt convinced, however, by this time, that the galvano-cautery was responsible in no small degree for the bad turn which the case had taken, and determined to follow out my original plan of procedure, but without the cautery. At each later application of the cautery, a notable inflammatory reaction had set in, and this had been more marked with each successive application, and finally there were grounds for thinking that the reaction and rapid extension of the tumor were in no small degree due to its use.

Following the plan, then, of removing the growth piecemeal, while at the same time every possible precaution and care was exercised in avoiding any unnecessary irritation of the parts, I dispensed entirely with all caustics or other application. As each piece was removed, the part was showered with the carbolized alkaline spray, till all pain was arrested, and after each operation the cut surface was coated with vaseline. In this manner, I very soon commenced to make headway again, and from this time on, matters commenced to improve, and with no single untoward symptom developing. I finally completely removed the last portion of the growth, and discharged my patient on November 4th, 1882.



Since that time I have occasionally seen the patient, the last time within a few months, and now at the end of nearly seven years, I think that any possibility of a recurrence can be entirely dismissed.

This case has been reported very fully, and at considerable length, but it has seemed to me that this is fully justified in view of the fact that it is the only case of recovery yet reported from a sarcoma of the naso-pharynx, a result which I think without doubt was entirely owing to the method of treatment adopted for its eradication.

In addition to the above, Thomas' reports the case of a girl, aged fourteen, who presented with a history of nasal stenosis and deafness, due to a growth in the naso-pharynx, which on examination was found to be of sufficient size as to block the orifice of the left Eustachian tube, together with the posterior nares of that side. The neoplasm was removed by means of Woakes's post-nasal forceps, the patient being in Rose's position. This case is reported as one of naso-pharyngeal sarcoma, yet there is no histological examination of the growth given, and no further report of the case. I am disposed to think, therefore, that this case scarcely warrants record as one of malignant disease.

Duffield, in a letter to the *American Lancet*, April, 1887, p. 125, also describes having seen Wahl, of Dorpat, perform Bruns's operation on the nose, after which a sarcomatous tumor of the naso-pharynx was extirpated, by means of a curette. This case, however, as far as I know, has never been fully reported.

ETIOLOGY.—Sarcoma is usually regarded as belonging rather to the earlier period of life. This is true as compared with carcinoma, and yet in the nineteen cases, above reported, there occurred:

Between 1 and 10 years of age . . . . .	2
“ 10 and 20 “ “ . . . . .	5
“ 20 and 30 “ “ . . . . .	3
“ 30 and 40 “ “ . . . . .	2
“ 40 and 50 “ “ . . . . .	7

Sex seem to exercise a notable influence, in that 14 of the cases occurred in males, while but 5 were in females. This excess is easily accounted for when we consider that sarcomatous tumors belong to the connective-tissue series, and bear a certain relation, therefore, to fibrous tumors, which as we know, occur almost exclusively in males.

SYMPTOMATOLOGY.—In the early stages of the development of these growths, they give rise to no symptoms which differ in any notable degree from those caused by the existence of any form of

tumor in this region which has attained sufficient size to impede normal nasal respiration, unless possibly the character of the secretion may possess symptomatic indication, as in most cases of sarcoma this is somewhat peculiar, in that it is of a sero-mucous, ichorous character, and usually quite offensive. This symptom manifests itself quite early in the history of the case, and is present in the majority of instances. Epistaxis also is liable to occur somewhat early, although it is not a prominent symptom, occurring in perhaps from one-third to one-half of the cases. The attacks, however, are rarely severe, or frequently repeated, and never become a grave symptom, as occurs in cases of fibroma. The general health seems to suffer also somewhat early in the history of the case, not that there is any special sarcomatous cachexia, nor does it appear to be due to any mechanical interference with respiration or deglutition, for in many instances it is observed before the tumor has attained such dimensions as to give rise to these symptoms. I take it that this impairment of the general health is due in no small degree to the offensive character of the discharge, which undoubtedly acts in a certain measure to impair digestion, and to vitiate the inspired air. The patient, in fact, lives in an atmosphere poisoned constantly by the offensive ill-smelling discharges from the tumor. Moreover, when we consider that so many of these cases occur during youth, I think we must recognize the interference with respiration, and its consequent impairment of the proper oxygenization of the blood, as forming an important factor in producing impairment of the general health, as is observed so frequently in connection with the benign growths in this region. As the growth develops in size, the additional symptoms of difficult deglutition, with recurrent attacks of dyspnoea, set in. The encroachment of the tumor upon the orifice of the Eustachian tube, naturally leads to the early development of impaired hearing, or the complete loss of this function. In Massei's case, there was suppurative otitis in both ears, although this occurred after an operation, and was possibly its direct result.

**PATHOLOGY.**—The origin of these growths is usually from the basilar process of the occipital bone, starting in the deeper layers of the mucous membrane lining the part, developing in the form of rounded, somewhat lobulated growths, which extend downward, forming a veil, as it were, over the posterior nares, and which more or less rapidly increase in bulk, while at the same time the attachment slowly extends over a larger area. As they develop, they send prolongations into one or both nasal cavities, but the activity of the growth usually seems to be downward, gradually encroaching upon the lower pharynx, and crowding forward the soft palate. They

are usually of soft consistency, and do not seem to possess the power of displacing the hard parts, or causing their destruction, although in Veillon's first case, the basilar process was perforated, and the brain invaded. This, however, was probably not the result of erosion by pressure, but more likely due to the fact, that the disease invaded the bony structures. In Marjolin's and Eppinger's cases also, the basilar process was destroyed in the same manner. In both Veillon's cases, and also in Verneuil's, the orbital cavity was invaded by prolongations of the tumor through the sphenoidal fissure, while in Neureuter's and Marjolin's cases, prolongations extended through the sphenomaxillary fissure, and invaded the tissues of the neck. In most of the instances above recorded, the tumor preserved its individuality, or distinct outline, during its whole history, with the exception of Case I., cited by Brévet, and Case XIX., reported by myself, in which at the end of three months it changed its character, in that it became diffused, and extended by a somewhat rapid progress, infiltrating the mucous membrane of the fauces. From the histological point of view, these growths differ in no essential degree from a sarcoma of the nasal cavity; the microscopic characteristics of the tissue need not be repeated here. Fig. 139 illustrates the appearance found in the author's case (Case XIX).

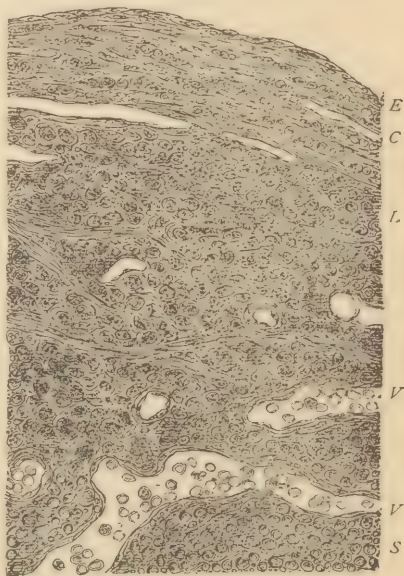


FIG. 139.—Round-Cell Sarcoma of the Naso-Pharynx (Case XIX.). *E*, Remnants of epithelium; *C*, dense fibrous connective tissue carrying capillaries; *L*, large round-cell sarcoma; *S*, small round-cell sarcoma; *V*, *V'*, sinuous veins.

DIAGNOSIS.—In appearance, these growths present an irregular, rounded, somewhat lobulated aspect, with a grayish-yellow, muddy-looking color, with perhaps a pinkish tinge, according to the richness of their vascular supply. They have the appearance to the eye, of a soft, pultaceous mass, which is verified by palpation with the finger. Their general aspect is apparently midway between the somewhat translucent appearance of a myxomatous tumor, and the pinkish-white, dense, opaque look of a fibroma. Their recognition, however, by mere ocular inspection, either by direct vision or the rhinoscopic mirror, can rarely be depended upon, and our only means of certain diagnosis, lies in a removal of a piece of the



growth for microscopic examination. This procedure is easily accomplished by a sharp cutting forceps, or the cold wire snare. Suspicion should be excited always, by the peculiar character of the discharge, which, as before stated, is of an ichorous and somewhat offensive character, but usually thin and watery, in contradistinction to the more purulent character of the discharge from a carcinomatous tumor. Furthermore, the hard, dense feeling of a carcinoma to the touch, is notably different from the softer consistency of the less malignant tumor.

The character of the tumor having been recognized, it becomes a matter of some importance to determine whether it arises in the nasal cavity, or in the naso-pharynx. This problem presents difficulties not always easy of solution. The points of difference already made in this connection in the discussion of naso-pharyngeal fibroma, apply with equal force to sarcoma. In addition to this, it is a somewhat notable clinical fact, that a nasal tumor is attended very rarely with secondary infiltration of the cervical glands, and when this does occur, it occurs late in the history of the disease, whereas in a pharyngeal growth, this symptom, if it occur at all, is liable to occur quite early. Secondary glandular enlargement is not usually characteristic of a sarcomatous tumor, and yet this is present in a certain proportion of cases, perhaps a third of those above reported. As regards sarcoma of the nasal cavities, I think it may be stated as a rule, that it shows a marked hesitancy in making its way into the pharynx, and that the mere presence of a tumor, which is ascertained to be of a sarcomatous character, more or less completely filling the pharynx, is a pretty clear evidence, that it had its origin in that region.

COURSE AND PROGNOSIS.—A sarcoma, especially in early life, runs a somewhat rapid course, although this rapidity of growth is dependent in no small degree upon the special character of the tumor. In a general way we may state, that a tumor composed of small round cells, runs an exceedingly rapid course, while the spindle-cell tumor develops more slowly, and in those cases in which there is a large admixture of fibrous tissue, the development of the neoplasm is very greatly retarded. Thus, in Lincoln's and Massei's cases, the tumor was reported as fibro-sarcoma, and its development extended respectively over periods of three and two years. On general grounds we must regard the prognosis in these cases as exceedingly unfavorable. In all of the above cases, death occurred either as the result of the disease, or from the operation, with the exception of Brevet's, Deprès', Lincoln's, Massei's, Annandale's, Bryant's and my own. With the exception of my own, the complete history of the case after the operation is not given, leaving, therefore,

but a single instance in which we have the report of a successful extirpation of one of these growths, and yet I think if one carefully analyses these cases, the conclusion is justified, that certainly in a very large proportion of them, the attempts at relief were not only postponed too long, but in many cases were not such as to warrant the expectation of a successful issue. In other words, these cases seem to prove, that the successful removal of a naso-pharyngeal sarcoma is not to be accomplished by resection of the upper jaw, or by any similar capital operation; but it remains yet to be proven, that the nicer manipulation, which is acquired by those devoting themselves to a special practice, may not yet be fully equal to dealing with these cases, especially when, from the onset, the patients are saved from the terrible hazard of a capital operation, especially in an individual already in a condition of impaired general health, as the result of the disease. Certainly in a case seen sufficiently early in its history, I think that there may be instances in which we can give a more favorable prognosis than the reports above given would seem to indicate. In this connection, it should be stated that sarcoma, especially in the very young, shows a tendency to generalization, as occurred in Neureuter's and Veillon's first case, this complication, of course, being evidenced by symptoms referable to the special organs affected.

TREATMENT.—After what has already been said, it is scarcely necessary to state, that the failure in all cases to even relieve symptoms by extirpating these tumors by means of a radical operation, and the fact that so many die upon the table, warrants us in condemning utterly this procedure. If success is to be in any manner anticipated, the growth must be extirpated through the natural passages, and by simple measures. I know of no cases in which electrolysis has been used, but what has already been said in regard to this measure in sarcoma of the nose, bears with equal force in regard to similar tumors in the naso-pharynx. The same also can be stated in regard to the use of caustics. The only question for discussion, therefore, in this connection, is as to the comparative merits of the use of the cold wire snare, or the galvano-cautery. Certainly no better result could possibly be accomplished, than that reported by Lincoln, as far as the immediate operation was concerned, nor could any operation be more successful, or more skillfully done. The selection of the means, however, must always be decided by the individual preferences of the operator, and the greater skill which his own experience may have given him, in the management of any special device. Certainly my own preferences are decidedly in favor of the cold wire snare, either in the form of Jarvis's instrument, or one of its various modifications. In removing

a sarcoma by this means, the operation is to be done much in the same manner as that already described in connection with fibromata of this region, with the difference, however, that hemorrhage in connection with sarcoma is not to be anticipated, to anything like the extent with which an operation for fibroma is complicated. Hence in removing the whole mass, or a portion of it, the separation of the part may be accomplished by a somewhat rapid movement. The advantage of the cold wire snare, as before stated, is the ease with which it may be manipulated, on account of its lightness of construction, and the additional fact, that in the naso-pharynx it can be operated, either through the nose, or perhaps better still, through the oral cavity, where we can obtain a thoroughly wide and open access to the part, by means of a simple palate retractor, or by tying up the palate, after the method already described on page 24. This access having been obtained, the wire loop is easily adjusted, either to the whole of the tumor, or to such portion of it as it is desired to remove, either under ocular inspection, or by the aid of a rhinoscopic mirror. Of course, if the growth has attained such size as to render these simple manipulations impracticable, wider access to the growth may be obtained by slitting the palate, a simple operation, which would scarcely complicate the case, or if demanded, Bruns's operation, or some similar preliminary operation on the external nose must be done, but I am disposed to think, that in the majority of cases the simpler operations offer the best hope of successfully extirpating these growths, and at the same time of protecting the patient from a recurrence. This latter, of course, is to be anticipated, as the clinical history of sarcoma teaches us. The question therefore arises, how we may best prevent this recurrence. Much stress has been laid, especially by Lincoln, on the importance of cauterizing the base of the tumor, after an operation. I am disposed to think, that there is a certain danger in this, especially in the naso-pharynx. Caustic agents cannot be used in this region with impunity, and it has by no means been determined that the use of a caustic may not, instead of destroying diseased tissue, stimulate the parts to a renewed malignant action. The suggestion occurs that we may with more safety depend on watching the parts carefully from time to time, and controlling any tendency to recurrence by the removal of the small masses as they develop. In other words, to discourage the growth by constantly taking away new tissue as it appears. This was successfully done in my own case, above reported, as also in my three cases of sarcoma of the nose. Mr. Butlin, in his recent work on sarcoma, teaches us that sarcoma rarely affects the lymphatic glands, and that it is therefore amenable to local measures of treatment. His



explanation is, that sarcoma arises by the proliferation of the cellular elements of the solid structures of the connective tissue, which compresses the lymphatics. Is it not safer, therefore, to depend on the complete eradication of the local disease, by such means as are attended with the least injury to soft tissues, viz., by their removal with the snare, rather than to make use of a device, such as the galvano-cautery, or other caustic agent, which, while destroying a certain amount of tissue, is liable to excite inflammatory reaction in the surrounding healthy structures?

## CHAPTER LXVII.

### CARCINOMA OF THE NASO-PHARYNX.

THE literature of carcinoma of the naso-pharynx is completed, as far as I have been able to learn, in the report of the following cases.

CASE I.—Reported by Durand-Fardel.<sup>1</sup> A male, aged 75, had suffered with difficulty in deglutition and respiration for some time, together with marked impairment of the general health, and progressive emaciation. An examination failed to reveal any difficulty with the thoracic or abdominal viscera. The voice was of the peculiar dead quality characteristic of stenosis of the naso-pharynx. An examination of the throat showed the palate pressed downward and forward by a tumor which seemed to have its origin in the upper pharynx. The mucous membrane was a purplish-red color. On each side of the neck and the face, were two elongated tumors, extending from the zygomatic arch to the lower part of the neck, consisting of enlarged parotid and cervical glands.

The subjective symptoms continued to increase, until suffocation seemed imminent, the tumor finally filling almost the entire buccal cavity, rendering the swallowing of food impossible, and the patient finally died of exhaustion.

The autopsy revealed a tumor, double the size of a hen's egg, taking its origin from the soft palate, and extending backward to the posterior pharyngeal wall, upward to about the level of the orifices of the choanæ, which it closed completely, and downward almost to the epiglottis. The tumor is reported as one of scirrhus, although no microscopic examination was made.

CASE II.—Reported by Maisonneuve.<sup>2</sup> This is the report of a case of cancer of this region, occurring in a man, aged 50, upon whom two operations had previously been done, respectively three, and one year before, the last operation consisting in extirpation of the superior maxilla. At the time the patient came under Maisonneuve's observation, the neoplasm completely filled the space formerly occupied by the jaw, and sent prolongations into the pharynx.

Access to the tumor was obtained by an incision through the cheek, extending from the oral commissure to the ear, after which a snare was applied, and the growth extirpated. It was found attached to the base of the occipital bone, and to the body of the sphenoid. The base was cauterized, as also some suspicious tissue on the right pterygoid. No further record of this case is given. The diagnosis of carcinoma was made.

CASE III.—Reported by Lotzbeck.<sup>3</sup> The case of a woman, 37 years of age, who suffered from primary carcinoma of the thyroid, and a secondary deposit in the inferior maxilla, the latter giving rise to fatal hemorrhage. On autopsy,

<sup>1</sup> Bull. de la Soc. Anat., 1837, p. 73.

<sup>2</sup> Gaz. des Hôpitaux, 1859, p. 313.

<sup>3</sup> Deut. Klin., 1859, No. 12, p. 122.

a third deposit was found, which had destroyed the basilar process of the occipital bone, and the body of the sphenoid, and entering the cranial cavity, had filled up the greater part of the middle fossa on the right side, and to a certain extent, on the left also. This portion had invaded the nasal cavity; the right antrum and orbit, and to a slight degree, the left orbit also.

The patient had suffered from amblyopia and then amaurosis of the right eye, headache, exophthalmos, and sudden amaurosis of the left eye, coming on in six hours.

CASE IV.—Reported by Flour.<sup>1</sup> A rather curious case occurring in a woman, aged 39, who for five or six years had noticed a small tumor on the right side of the neck. The growth had been quiescent for a considerable period, but within the past few months had increased quite rapidly in size, and its feeling upon palpation gave evidence that it involved the deep glands which surrounded the carotid artery, as well as the superficial cervical and the submaxillary glands.

Upon closely questioning the patient it was found that she had been subject to attacks of epistaxis, colds in the head, nasal stenosis, and difficulty in hearing, these symptoms being more marked on the right side. The voice was of peculiar harshness. An inspection of the anterior nares revealed nothing of note. On examining the throat a tumor was discovered in the upper part of the pharynx, of a reddish-blue color, the origin of which could only be satisfactorily explored by passing the finger behind the palate. This manipulation revealed that the tumor sprang from the basilar apophysis of the occipital bone, and obstructed the posterior orifice of the right nasal fossa. It was hard, firm, and somewhat nodulated to the touch.

The growth had apparently existed for a long time, and had given rise to comparatively insignificant symptoms. An examination of the larynx revealed complete paralysis of the right vocal cord, showing that the pneumogastric was involved in the glandular enlargement of the neck, and a contraction of the pupil seemed to point to a similar involvement of the sympathetic nerve.

Flour regarded this case as one of a primary carcinoma of the vault of the pharynx, with a secondary deposit in the cervical glands of the right side. No microscopic examination was made of the growth, and no operation was performed.

CASE V.—Report by Schmid.<sup>2</sup> A case of carcinoma of the naso-pharynx as occurring in a male, 65 years old. Nine months before presenting himself for treatment he noticed that he had frequent colds in his head with mucous and muco-purulent discharge from the nose, occasionally tinged with blood. There had also been constantly increasing nasal stenosis, and of late, swallowing had been difficult, as though there was a foreign body in the throat.

Examination revealed an elastic tumor filling the naso-pharyngeal cavity and blocking the choanæ.

The tumor was removed by Gussenbauer's operation. Two months after there was a recurrence which necessitated the removal of the greater part of both superior maxillæ. At the end of two weeks recurrence again took place, and operative interference being deemed hopeless, the patient died a few weeks later. The growth was a small-celled medullary carcinoma.

The following case occurred in my own practice.

CASE VI.—Miss L—, a maiden lady, aged 59, consulted me on November

<sup>1</sup> Thèse de Paris, 1873 (cited by Veillon, Thèse de Paris, 1874, p. 463).

<sup>2</sup> Prag. Med. Wochenschr., 1881, vol. vi., p. 262.



9th, 1886, with the following history: For two years she had had a catarrhal trouble attended with nasal stenosis and a somewhat unpleasant discharge, the symptoms being more marked on the right side. The secretion, although not abundant, was muco-purulent, containing occasionally dark blood clots. Eight months previously there appeared on the neck a large mass of swollen glands, hard, somewhat nodular, and irregular in shape, but not painful. These conditions had changed but little when she came under observation. At this time a rhinoscopic examination revealed the existence of an irregularly rounded, grumous-looking mass in the pharyngeal vault, attached apparently to the basilar process of the occipital bone, and hanging down over and occluding the right posterior nares, while an examination through the nasal cavity simply revealed a certain amount of stenosis of that side due to a deflected septum, but no tumor was observed in this manner. The pharyngeal tumor was extracted in a number of pieces by means of a cold wire snare manipulated through the mouth. The amount removed was perhaps the size of a small

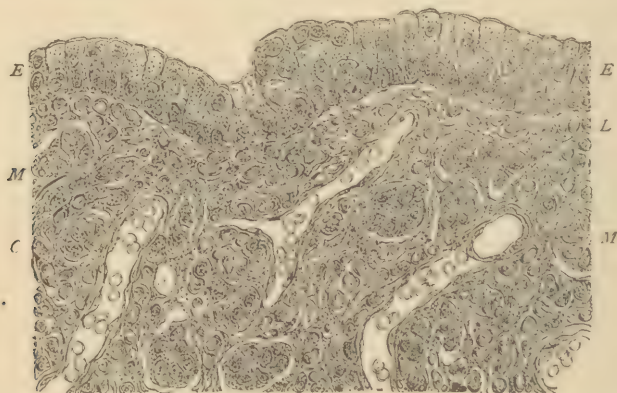


FIG. 140.—Carcinoma of the Naso-pharynx (Case VI). *E, E*, Columnar epithelium in proliferation; *L*, lymph or adenoid tissue with blood-vessels; *M*, multi-nuclear bodies or giant cells; *C*, cancer epithelium.

walnut. The operation gave entire relief to the nasal stenosis. A portion of the growth was submitted to Dr. Chas. Heitzmann for examination, who reported as follows:

"The shreds removed from the pharyngeal vault of a lady, 59 years of age, after having been hardened in a chromic acid solution, under the microscope presented the following features: The tissue is composed mainly of lymph or adenoid corpuscles in different stages of development, imbedded in a delicate myxomatous reticulum. Scanty bundles of fibrous connective tissue traverse the lymph-tissue, mostly broken up into inflammatory corpuscles. In the lymph tissues there are imbedded numerous small nests of concentrically arranged epithelia, all of small size. In one of the sections a lymph-vessel was seen crowded with lymph-corpuscles and single epithelia of a moderate size; besides coagulated fibrin.

"Diagnosis: Medullary cancer invading lymph-tissue." (See Fig. 140.)

The patient was seen several times during the following month, and small pieces of the growth removed from time to time by the snare. The patient expressed great relief at the operations and seemed to think that the glandular enlargement in the neck had subsided "fully one-fourth," as she expressed it.

The mass in the neck originally covered an area as large perhaps as the palm of the hand, and was situated immediately below the angle of the right jaw, a hard and dense, irregularly rounded mass with the characteristic feeling of malignant infiltration. This patient continued under observation until the following June. During this period the glandular mass became somewhat larger, and during the early spring ulceration set in upon its surface, which continued for perhaps six weeks, discharging a sero-sanguinolent fluid, and finally healed up. Her health during this time became notably impaired, the typical cancerous cachexia setting in. In June, she went to the mountains, where little change took place other than progressive and gradual failure of the vital powers until early in September, when brain symptoms manifested themselves, as evidenced by somnolence and occasional lapses into a semi-unconscious state from which she could not be aroused. This condition lasted until the middle of October when death occurred from exhaustion. No autopsy was made on the case. While under my observation during the summer, the pharyngeal growth seemed to be in abeyance, as there was very little recurrence of the malignant disease in this region, its powers apparently expending themselves in the cervical infiltration, which increased largely during the summer, and ultimately by an invasion of the cranial cavity. During the whole history of this case there was comparatively little pain referable to the site of the growth or neighboring parts, and especially was this characteristic of her latter days, which consisted mainly of a state of stupor or semi-unconsciousness.

We find, thus, that in its primary development and in the subjective symptoms to which it gives rise, carcinoma of the nasopharynx differs in no notable degree from that of sarcoma, causing as it does simple obstruction to nasal respiration together with a certain amount of unpleasant discharge, mixed perhaps with blood, and the deformity and impairment of function of the fauces according to the size of the tumor. It is noticeable, however, in all those cases of which we have complete clinical records, that secondary enlargement of the tissues of the neck occurred comparatively early in the history of the disease, and furthermore that this infiltration proceeded without much change, and with little tendency to rapid development, for a considerable period of time.

The diagnosis, of course, would be in most instances rendered fairly complete by the existence of this one symptom, although its thorough determination must always depend upon the removal of a piece of the neoplasm for microscopic examination.

As regards both prognosis and treatment, there is little to be said. The disease is necessarily fatal and runs its course in from one to three years, for although the histories in Maisonneuve's and Flour's cases are not complete, there can be no question whatever as to the ultimate result of the disease.

The plan of treatment is necessarily one which must be decided by the surgeon in each individual case, or even the question as to

whether any treatment at all should be resorted to. In my own case the successful removal of the growth was accomplished with but a trivial amount of pain or even discomfort to the patient, and the relief to symptoms was not only very great for a time, but furthermore, the patient was made happy for weeks and even months with the idea that her disease was being brought under subjection. There may possibly be something of suggestion in this.

A witty French writer has told us, that the only treatment for consumption is by opium and lying, an assertion in which there is less of cynicism than would at first appear, and which might equally well be made in regard to cancer.

As regards the advisability of a radical operation, such as a resection of the superior maxilla, and procedures of this kind, there would seem to be very little justification for subjecting a patient to this great hazard, from our clinical experience of the disease as at present recorded.



## SECTION III.

### EXTERNAL SURGERY OF THE NOSE.



# EXTERNAL SURGERY OF THE NOSE.

## CHAPTER XLVIII.

### EXTERNAL SURGERY OF THE NOSE.

UNDER this heading is embraced a description of those operations, by which a larger access to the nasal passages is obtained for the removal of tumors, either of the nasal cavity itself, or of the naso-pharynx and which involve,

- (1st) incisions through the hard or soft palate, or both.
- (2d) incisions through the external integument alone, and
- (3d) incisions through the external integument, together with section of bone.

Under the first group are included the following operations:

Manne's operation, consisting in a division of the soft palate.

Maisonneuve's operation, of median incision of the soft palate, with preservation of its free border.

Nélaton's operation of division of the soft palate, with a resection of a portion of the hard palate.

Botrel's operation, of incision of the soft palate, with the preservation of its free border, and a resection of a part of the hard palate.

Richard's operation of trephining the hard palate.

Sédillot's operation of osteo-plastic resection of the hard palate.

Dezeanneau's operation of a temporary resection of a portion of the hard palate.

Under the second group is described:

Dieffenbach's minor operation, which consists of a slitting up one or both alæ of the nose, or a section of the columna.

Lariche's operation for separation of the columna.

Under the same group may be included:

Rouge's operation, which consists of an incision through the mucous membrane at the ginglivo-labial fold, which is carried upward, in such a manner as to permit of the upper lip and soft structures of the nose being turned upward so as to expose the



bony orifice of the nasal cavities; as also the operation of Palasciano and Rampolla, of puncturing the superior meatus through the os unguis, for the manipulation of a ligature.

Under the last group are embraced:

Boeckel's operation of turning the nose bodily to one side, by incisions through the integument, nasal bones, nasal process of the superior maxilla on one side, and the septum.

Ollier's operation, which consists of depressing the nose bodily, after incision through the integument, nasal process of the superior maxilla and nasal bones on both sides, and the septum.

Lawrence's operation of turning the nose bodily upward on the forehead, by incisions through the columna, alæ, septum, nasal bones, and nasal process of the superior maxilla on both sides.

Langenbeck's operation, which consists of a temporary resection of one nasal bone, together with the nasal process of the superior maxilla of the same side.

Linhart's operation, which consists of a separation of a nasal bone from the septum, and the corresponding bone of the opposite side, in the median line.

Bruns's operation, which consists of tilting the nose bodily to one side, somewhat after the manner of Boeckel, but differing in that a wider opening is obtained, by extending the bony section beyond the nasal bones, into the superior maxilla, the nostril being left intact.

Fournaux-Jordan's operation, which consists of exposing and enlarging the bony orifice of the anterior naris.

Huguier's operation, which consists of a temporary depression of the lower portion of the superior maxilla.

Cheever's operation, which accomplishes the same purpose by a somewhat simpler means.

Cheever's double operation, which consists of a temporary depression of the lower half of the superior maxillary bones of both sides.

Waterman's operation, in which the depressed superior maxilla of one side remains attached only posteriorly, the hard palate being divided close to the septum.

Roux's operation, which consists of a temporary resection of the entire superior maxilla.

Annandale's operation of separating the superior maxillæ by division through the hard palate.

Langenbeck's operation of temporary resection of the upper portion of the superior maxilla.

Billroth's operation for accomplishing the same purpose, differing somewhat from Langenbeck's, in that the mass is turned outward instead of upward.



Plate I

FIGURE 1. Cleft of the Lip and Palate. The upper lip is split, and the underlying internal structures are visible through the opening.

FIGURE 2. Cleft of the Lip and Palate. The upper lip is split, and the underlying internal structures are visible through the opening.





Demarquay's operation of permanent resection of the anterior wall of the antrum and the nasal process of the superior maxilla.

Syme's operation, of permanent resection of the entire superior maxilla of one side.

Maisonneuve's operation of permanent resection of the lower half of the superior maxilla of one side.

Péan's operation of permanent resection of the posterior and lower portion of the superior maxilla of one side.

Mott, Huguier, Vallet, and Berard's operations, of permanent resection of a portion of the superior maxilla.

#### MANNE'S OPERATION.

This simple operation was first performed by Manne,<sup>1</sup> in order to gain wider access to the naso-pharynx, for the removal of a fibro-myxomatous growth, the size of an egg, which completely filled that cavity, the incision being made through the soft palate, from below upward, by means of a bistoury, in the median line, extending from the tip of the uvula to the junction of the hard palate. Subsequently Levret,<sup>2</sup> in a somewhat similar case, slit the palate at the side of the uvula, thus accomplishing an equally good purpose, with a shorter line of incision, a proceeding regarded by Jobert<sup>3</sup> as preferable. This operation is, of course, quite simple in its performance, and involves no complications. The parts are subsequently restored by the insertion of one or more sutures, although the tissues would become re-united probably in the majority of cases even without such interference.

#### MAISONNEUVE'S OPERATION.<sup>4</sup>

This device consists of making an incision in the median line from the junction of the hard palate down into the body of the uvula as far as may be necessary, thus securing a somewhat wide opening through the soft palate, while at the same time its free border is preserved.

The advantage of this procedure becomes quite apparent without further comment. It was originally done by Maisonneuve for the removal of a fibro-vascular tumor, which was successfully extracted by means of a snare, after which the parts were reunited by a single suture.

<sup>1</sup> "Dissertation curieuse, au sujet d'un polype extraordinaire," etc., Avignon, 1717.

<sup>2</sup> "Obser. sur la cur radicale de plusieurs polypes," Paris, 1749.

<sup>3</sup> *Gaz. des Hôpitaux*, July 22d, 1858, p. 337.

<sup>4</sup> *Comp. Rendu de l'Academie des sciences*, July to Dec., 1859, vol. xlix., p. 292.

NÉLATON'S OPERATION.<sup>1</sup>

Following out the method of Manne, the distinguished French surgeon Nélaton devised an operation for the extirpation of growths arising from the basilar apophysis, which he performed as follows:

The uvula being seized with a pair of forceps, it, together with the curtain of the palate, was divided exactly in the median line as far as the hard palate, then with a stout double-bladed knife, this median incision was continued along the hard palate to a point about seven-eighths of an inch from the incisor teeth. From the extremity of this incision the membrane covering the hard palate was incised on either side, directly outward, that is, in a line per-

pendicular to the first, over a distance of from three-quarters of an inch to an inch. The wound in the hard palate thus assumed somewhat the form of the letter T. A periosteum knife was now introduced, and the mucous membrane covering the hard palate was separated along the line of incision, as far back as the velum. The knife was now passed through the junction of the mucous membrane of the nasal cavity with that of the palate. Next, at the outer extremity of each horizontal incision, a perforation was made through the hard palate, through which one

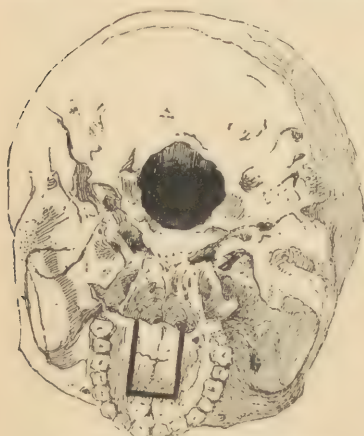


FIG. 141.—Lines of Bony Section in Nélaton's Operation.

blade of a stout pair of scissors was inserted, and all this portion of the bony palate was removed, together with a portion of the vomer (see Fig. 141), taking care to preserve as much as possible of the mucous membrane covering the upper surface of the fragment, that is, of the floor of the nose. A large opening was thus formed, which gave easy access to the base of the skull. Moreover, this wound could be kept open for any length of time, and any evidences of recurrence promptly treated and dissipated. After a cure had been effected the margins of the palatine wound could be approximated, and in many cases a certain amount of bone was reproduced, and the contour of the hard palate restored.

BOTREL'S OPERATION.<sup>2</sup>

In order to gain a wider access to the naso-pharynx, and still preserving the free border of the soft palate, Botrel combined

<sup>1</sup> *Gaz. des Hôp.*, 1849, 3 S., vol. i., p. 128.

<sup>2</sup> *Rev. Méd. Chir. de Par.*, 1850, vol. viii., pp. 90-102.

Maisonneuve's incision of the soft palate, with Nélaton's operation just described, of resecting a portion of the hard palate; the steps of the operation need not be entered into, as they differ in no respect from those already described.

#### RICHARD'S OPERATION.<sup>1</sup>

This device accomplishes much the same purpose as that of Nélaton, while at the same time the integrity of the soft palate is preserved. The procedure is as follows: An incision is made in the median line, from the posterior border of the hard palate, forward to the alveolus, extending well down to the bone, after which the periosteum is dissected up on either side, over the whole area of the bone, which it is designed to remove, when the bony palate, to such an extent as may be necessary, is removed by means of a chisel, and free access gained to either one or both nasal cavities, according as may be desired. After the indications for which the operation is done have been fulfilled, Richard apparently leaves the mucous membrane and periosteum *in situ*, without further procedure, although Gussenbauer<sup>2</sup> performed a similar operation subsequently, and inserted sutures for reuniting the flaps of mucous membrane and periosteum.

#### SÉDILLOT'S OPERATION.<sup>3</sup>

Sédillot makes a linear incision in the median line through the soft palate, by means of a bistoury, extending the incision through the mucous membrane of the hard palate as far forward as the palato-maxillary suture, cutting down to the bone, after which, by means of a periosteum elevator, the oral faces of the palatal process are denuded, and subsequently, by passing up behind the border of the soft palate, its nasal surface is subjected to the same manipulation. After this, the horizontal plate of the palatal bone is exsected (see Fig. 142), by means of a stout scissors or forceps. By this means, fairly wide access is obtained to the nasopharyngeal cavity, for such subsequent procedure as may be indicated. The edges of the wound are to be reunited by sutures, with

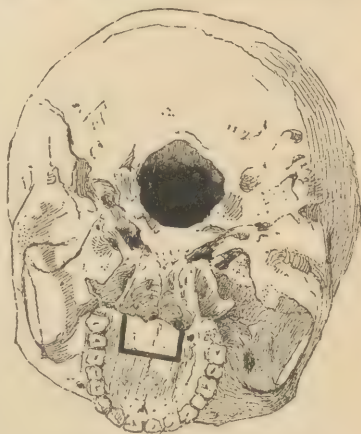


FIG. 142.—Sédillot's Operation; Lines of Bony Section

<sup>1</sup> As cited by Beuf, Thèse de Paris, 1857. No. 69, p. 32.

<sup>2</sup> Arch. für Klin. Chir., 1879, vol. xxiv., p. 265.

<sup>3</sup> Mémoires de la Société de Méd. de Strasbourg, 1864, vol. i., p. 160.



the prospect of complete restoration of the bony parts which have been removed. Sédillot detailed the steps of this operation, as one which he intended to pursue, in a case presented to the society, although we have no record of the operation having been done.



FIG. 143.—Dezeanneau's Operation; Lines of Section of Hard Palate.

when it is carried across at right angles, until it approaches the alveolar process, and is again turned and carried back to the junction of the hard and soft palate, at its alveolar extremity (see Fig. 143). In this manner, a quadrilateral flap, as it were, is formed in the hard palate, which can be depressed in such a manner as to admit of free access to the nasal cavity above, the flap turning on the junction of the hard and soft palates as a hinge.

#### DIEFFENBACH'S OPERATION.

This operation is designed to obtain a wider access to the anterior nares, for the removal of such growths in this region as do not admit of extraction through the natural passages, and although perhaps previously suggested by Dupuytren,<sup>2</sup> it was first performed by Dieffenbach.<sup>3</sup>



FIG. 144.—Dieffenbach's Operation; Line of Cutaneous Incision.

<sup>1</sup> *Gaz. des Hôpitaux*, 1862, p. 530.

<sup>2</sup> *Jour. de la Clin.*, vol. ii., 1830.

<sup>3</sup> *J. compl. du Dict. d. Sc. Méd., Par.*, 1831, vol. xl., pp. 41-45.

It consists in making an incision which, commencing at the lower and outer angle of the nostril, is carried along the base of the nose, in the naso-labial fold (see Fig. 144), until the ala of that side can be easily turned upward and inward, thus exposing the whole of the anterior chamber and lower meatus, with a portion of the middle meatus. If it is necessary to expose both cavities, the same operation can be done on the opposite side, the opening being notably enlarged, by separating the columna, by an incision through the integument at the labio-columnar fold.

The proceeding is attended with no special danger or complication, the hemorrhage being slight. The parts reunite readily, although Dieffenbach advises the insertion of sutures. I have done this operation in but a single case, and that for the extraction of a dead osteoma, whose size did not admit of its removal through the nostril. I am disposed to think, however, it will be but rarely indicated at the present day, in that the additional space gained, would not greatly facilitate our methods of manipulation through the anterior nares.

#### LARICHE'S OPERATION.<sup>1</sup>

A somewhat similar device was that of Lariche, who in order to remove a tumor involving the lower portion of the cartilaginous septum, made a V-shaped incision having its ends in the lower border of either nostril, while the apex was in the median line



FIG. 145.—Lariche's Operation; Lines of Cutaneous Incision.

perhaps a quarter of an inch below the columna. In this manner the columna was separated from the upper lip and the lower border of the septum (see Fig. 145). This being turned upward, the lower portion of the septum, together with the growth, was removed with a scissors, and the columna subsequently restored to its position, and held in place by sutures.

<sup>1</sup> *Gaz. des Hôpitaux*, Paris, 1874, p. 579.

## ROUGE'S OPERATION.

(See Colored Plate I., Fig. I.)

This operation was first devised by Rouge,<sup>1</sup> in order to gain freer access to the nasal cavities, in a case of syphilitic ulceration and necrosis, and is performed as follows: The patient being turned on his side, to facilitate the escape of blood, the upper lip is seized firmly by a assistant, and drawn up over the nose in such a way as to thoroughly expose the ginglivo-labial fold, when an incision is made through the mucous membrane, extending from the first molar tooth on one side, to the same point on the opposite side, after which the lip and face are dissected from the bones, until the lower border of the anterior nares is exposed, and the septum reached, which is now divided by means of a stout pair of scissors, in sufficient extent to allow of the nose being turned up over the face, in such a manner as to more or less completely expose the bony openings of the nasal passages. If necessary, the cartilaginous septum may be completely divided, in order to facilitate the rolling backward, as it were, of the lower part of the face. The facility of access thus gained to the nasal cavities, is practically limited only by the size of their bony openings anteriorly. For convenience of manipulation, and ease of illumination therefore, the gain is no small one, especially when we consider the comparative simplicity of the operation, which, according to Rouge, is accomplished without any dangers, and with no great risk of complications. The hemorrhage is comparatively slight, the reaction not notable, and furthermore, after restoration of the parts, union is complete in one or two days, the patient suffering but trivial discomfort as the result of the operation. The operation, however, is interesting, more from an historical point of view, and from its novelty, than as one which would be frequently resorted to at the present day, and yet undoubtedly, many cases may occur, in which indications will best be carried out by its performance. The field of operation might undoubtedly be further enlarged, without complicating the procedure, by temporarily resecting one or both nasal bones, and perhaps removing a portion of the septum.

## PALASCIANO'S OPERATION.

This operation is interesting, only as illustrating one of the curious devices which occasionally originate in the minds of surgeons. It consists of making an incision through the integument over the lachrymal sac (see Fig. 146), which is partially dissected out,

<sup>1</sup> Bull. Soc. Méd. de la Suisse Rom., Lausanne, 1868, vol. ii., pp. 265-268.



when a puncture is made through the os unguis, and access gained to the superior meatus through the opening, when a canula is inserted, carrying a ligature, which, in some manner, is arranged around the pedicle of a polyp, which being separated in this manner, is extracted through the natural passages. Four cases are reported by Palasciano<sup>1</sup> and Rampolla<sup>2</sup> as having been operated upon in this manner. Their success, however, was by no means flattering, recurrence having taken place in two cases, death in the third, while in the remaining case, abscess of the orbit followed the operation.



FIG. 146.—Line of External Incision in Palasciano's Operation.

### BOECKEL'S OPERATION.<sup>3</sup>

This operation is designed to obtain a wider access to either the nasal cavity, or to the nasopharynx, and consists of a temporary resection of the whole body of the external nose, in the following manner: An incision is made across the bridge of the nose, from one lachrymal sac to the other, the cut being carried well down to the bone. A second incision is then made, commencing at one extremity of the primary incision, and carried along the nasal furrow, down to the margin of the nostril, which it opens. A third incision separates the columna



FIG. 147.—Line of Cutaneous Incision in Boeckel's Operation.

<sup>1</sup> Bull. de la Soc. de Chir. de Paris (1860), 1861, 2 S., vol. i., pp. 372-376.

<sup>2</sup> Ibid., pp. 140-144.

<sup>3</sup> "Addition à la traduction du Traité des Resections d'Heyfelder," par M. Boeckel, 1863, p. 294.

from the upper lip (see Fig. 147). The bones in the line of the first incision are now divided by means of a chain saw, which is entered through a puncture made directly through from the one side to the other. The bones in the line of the second incision are then divided by means of a saw (see Fig. 148), after which the septum opposite the line of the primary incision, or as far back as it can conveniently be done, is separated by means of stout scissors or cutting forceps. The whole body of the nose is now turned over upon the cheek of the opposite side by means of a stout pair of forceps, thus fracturing the nasal process of the superior maxillary



FIG. 148.—Line of Bony Section in Boeckel's Operation.

bone on that side. If, however, there is too much resistance, this part can be weakened or severed on the inner side, by means of a chisel. In this manner, free access to the nasal passages is obtained, but if it is desired to gain a larger access to the nasopharynx, the additional step may be taken, of complete resection of the vomer, and the turbinated bones also if necessary.

After the removal of the growth, for which the operation was done, the nose is placed in position, and held by sutures through the integument, in the line of the original incisions.

The parts reunite readily, without deformity, the cicatrix being scarcely noticeable. The procedure is a comparatively simple one, and involves no great danger or complications, but few vessels requiring ligature.

This operation, in all its essential features, had already been done previous to Boeckel's time by Chassaignac<sup>1</sup> in a case of malignant disease of the nose (see Case IV., Sarcoma of the Nose), and has been the subject of some discussion as to priority. Boeckel, however, undoubtedly first suggested it as a complete temporary resection, in that in Chassaignac's case there is no report of his having restored the bony parts to their normal position, although, as a matter of fact, this could not have been done, in that they were much disorganized as the result of the malignant disease.

<sup>1</sup> *Moniteur des Hôpitaux*, 1854, vol. ii., pp. 266-268



PLATE II

OPER.  
BOT.





OLLIER'S OPERATION.<sup>1</sup>

(See Colored Plate II., Fig. I.)

This operation was first performed by the surgeon whose name it bears, in 1864, upon a patient suffering from a naso-pharyngeal fibroma, which completely blocking the naso-pharynx, rendered nasal respiration impossible, and by pressure had partly destroyed the vomer. The patient having been etherized, an incision was made, beginning just above the ala of the nose, extending upward to its root, thence across this, and downward to a corresponding point on the opposite side of the nose (see Fig. 149). The in-

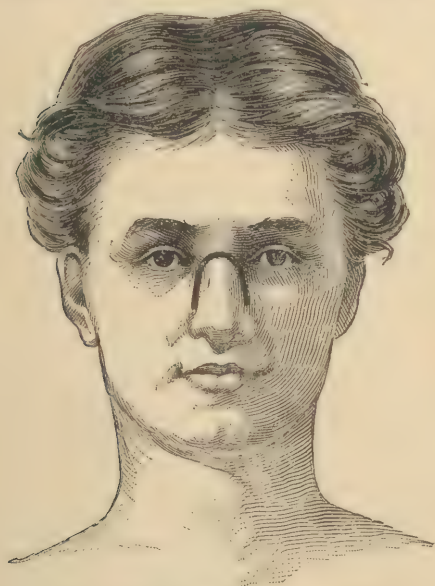


FIG. 149.—Line of Cutaneous Incision in Ollier's Operation.

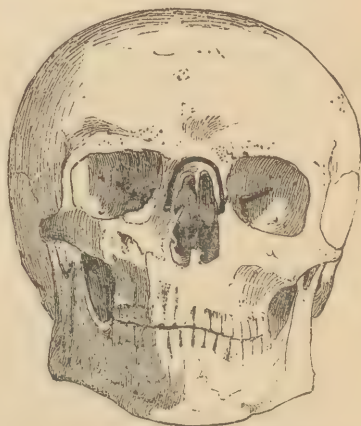


FIG. 150.—Line of Bony Section in Ollier's Operation.

cision divided all the parts down to the bone. A thin-bladed saw was then made to divide the nasal bones and the septum, in the line of the cutaneous incision (see Fig. 150). The nose, thus freed from its attachment, was tilted downward upon the face, thus giving free access to the nasal cavity, and through this, to the vault of the pharynx. The tumor was removed in a number of pieces, by means of forceps, the nasal cavities being thoroughly explored with the finger, for any traces of the growth remaining in them. The nose was then replaced, and held in position by metallic sutures, the periosteum

<sup>1</sup> Mém. et Compte Rendu de la Société de Science Médicale de Lyon; 1864-65; vol. iv., 2d part, p. 46.

not being included in the sutures. The nasal fossæ were filled with sponges, to prevent hemorrhage. Primary union took place through almost the entire wound, and the patient was discharged cured, in about six weeks.

#### LAWRENCE'S OPERATION.\*

This operation is designed to accomplish the same purpose as those of Ollier and Boeckel, differing from them only in this feature, that the body of the nose is tilted upward upon the forehead. It is done in the following manner: An incision through the integument is made with a scalpel, extending from the lachrymal sac of



FIG. 151.—Line of Cutaneous Incision in Lawrence's Operation.



FIG. 152.—Line of Bony Section in Lawrence's Operation.

one side, along the nasal furrow, to the margin of the nostril, which is opened. A second incision is made upon the opposite side, and in the same line, and lastly, the column of the nose is divided at its junction with the upper lip (see Fig. 151). Subsequently, by means of a stout pair of scissors, or bone forceps, the bone in the line of each lateral incision is divided, from below upward, while the septum is divided in the same way (see Fig. 152). The nose is now seized with a stout pair of forceps, or the fingers, and turned bodily up upon the forehead, thus breaking up the suture between the nasal bones and the internal angle of the frontal, which thus acts as a hinge, as it were, upon which the whole mass turns.

\* *Med. Times and Gaz.*, London, 1862, vol. ii., p. 491.





PLATE III





After the removal of the tumor, the nose is placed in position, and held by sutures, union taking place readily, without deformity. It should be stated, however, in regard to this operation, that while accomplishing the same purpose as those of Boeckel and Ollier, it involves a somewhat greater risk, in that the pedicle being so small, there is a possible danger of perfect circulation not being restored to the parts after the operation, and hence sloughing of the flap might occur.

#### LANGENBECK'S OPERATION FOR RESECTION OF THE NASAL BONE.<sup>1</sup>

This was done in order to again access to the anterior nasal passages, by temporary resection of the bony lateral wall of the nose, and is done as follows: A primary incision, by means of a bistoury, is made, commencing in the median line, just above the root of the nose.



FIG. 153.—Line of Cutaneous Incision in Langenbeck's Operation.

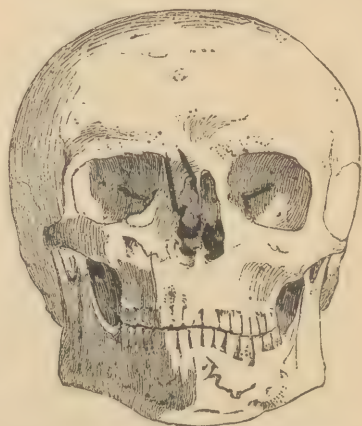


FIG. 154.—Lines of Bony Incision in Langenbeck's Operation.

This is carried across the bridge of the nose, and down one side, and extended along the middle of the nasal bone, till it reaches the ala (see Fig. 153), after which the cutaneous flap is dissected up by means of an elevator, until the nasal bone, covered with its periosteum, is laid bare in its whole extent. The ala is then separated from the nasal bone, and a forceps inserted through the opening, and the nasal bone separated from its fellow along the median line.

<sup>1</sup> Deut. Klin., 1859, No. 48, p. 471.



The forceps is now inserted at the outer angle of the lower incision, and a section made directly up through the nasal process of the superior maxilla, extending toward the inner canthus, until the orbit is reached (see Fig. 154), thus making a small opening into the antrum of Highmore. The piece thus separated, is now seized with forceps and turned directly up over the eye. In this manner, a



FIG. 155 —Lines of Cutaneous Incision in Langenbeck's Later Operation.

comparatively wide opening is made into the nasal cavities, and if necessary, access obtained to the naso-pharynx. When the design of the operation has been accomplished, the parts are restored to place, and held by sutures through the integument. This operation is attended with no special danger or complications.

This procedure was subsequently modified by Langenbeck<sup>1</sup> (see Colored Plate III., Fig. I.), in that instead of the single incision through the integument, two incisions were made; one along the anterior and another along

the posterior border of the nasal bone, coming down to the ala, at which point they were united by an antero-posterior incision, separating the ala from the lower border of the nasal bone (see Fig. 155). The bone was then divided along the line of the cutaneous incision, and the osteo-cutaneous flap was turned upward, securing the same opening as in the first operation.

#### LINHART'S OPERATION.<sup>2</sup>

This operation is designed to gain access to the anterior nares, and is performed, by making a linear incision from the root of the nose to its tip, which is then extended into the nostril of one side, after which the nasal bone is seized by forceps, and turned forcibly to one side, after separating its attachment to its fellow.

A somewhat similar operation was performed for the removal of a vascular tumor of the septum by Verneuil<sup>3</sup> who made a linear

<sup>1</sup> Archiv für Klin. Chir., 1867, vol. viii., p. 423.

<sup>2</sup> "Operations-Lehre," 3 Aufl., as cited by Bruns, Berliner Klin. Woch., 1872, No. 13.

<sup>3</sup> Annal. des Mal. de l'Oreille, 1875, vol. i., p. 169.

incision from the root of the nose in the median line to the junction of the nasal bones with the alæ, and then along the lower border of each nasal bone, to the malo-nasal furrow, thus making a Y-shaped incision, after which the nasal bones were separated, opening each nasal cavity and exposing the tumor on the septum.

#### BRUNS'S OPERATION.<sup>1</sup>

(See Colored Plate IV., Fig. II.)

This operation resembles, to a certain extent, that of Boeckel, in that the whole body of the nose is temporarily resected, and turned over to one side. The incisions, however, involve a larger area than those of Boeckel, thus gaining a wider access to the cavity. The

operation is done as follows: The first incision commences just below the outer margin of the nostril of the healthy side, and is carried directly across in a horizontal line, to from half to three-quarters of an inch beyond the margin of the opposite nostril. The

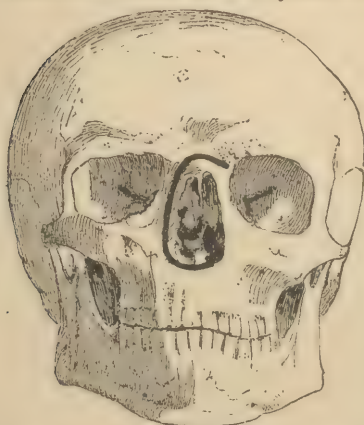


FIG. 157.—Lines of Bony Section in Bruns's Operation.

incision is carried fully down to the bone, care being exercised not to puncture the mucous membrane of the gingivo-labial fold. A second incision is made directly across the narrowest part of the bridge of the nose, the terminus being just above each inner canthus. A third incision joins the outer extremities of those two, thus extending into the cheek, somewhat beyond the nasal furrow (see Fig. 156). A saw is now inserted at the point of origin of the first incision, its tip being carried into the nasal cavity. A section is



FIG. 156.—Lines of Cutaneous Incision in Bruns's Operation.

now made through the anterior nasal spine and the septum, and the saw carried throughout the whole extent of the original line of

<sup>1</sup> Berliner Klin. Woch., 1872, No. 12 and 13, pp. 137 and 149.

incision, the section being confined entirely to the superior maxilla, cutting through also the septum, and the anterior portion of the lower turbinated bone (see Fig. 157). What Bruns accomplishes here, is an enlargement of the original bony opening of the anterior nares, sawing out a strip of bone, as it were, from a quarter to three-eighths of an inch wide, surrounding this opening. In order to accomplish this, as we see, the free end of the saw plays in the nasal cavity, the instrument being tilted, as it were, in this direction, thus making a bevelled cut. After the primary section is made with the saw, the bony septum is cut by means of a stout forceps or scissors from below upward, and the whole nose seized with the fingers or forceps, and turned bodily over on the cheek. This operation of Bruns is very simple, and yet a very ingenious device, as by this means he obtains a wide access to the nasal passages, and if necessary, to the naso-pharyngeal cavity, for the removal of neoplasms, or the carrying out of other indications. No vessels of any size are encountered during the steps of the procedure, and the operation may be finished without notable complication. After the indications have been accomplished, the parts are restored to position and held in place by sutures through the integument.



FIG. 158.—Line of Cutaneous Incision in Fournaux-Jordan's Operation.

It might be noticed in this connection, that in one of Bruns's operations, the wound was left open for a period covering three weeks, for the purpose of treating the stump of the growth, at the end of which time, the edges being somewhat freshened, they were easily and successfully reunited by sutures.

#### FOURNAUX-JORDAN'S OPERATION.

An operation which accomplished much the same purpose as that of Bruns, and in a much more simple manner, is that devised by Fournaux-Jordan<sup>1</sup> and which is done as follows. A sharp-pointed bistoury being inserted into the gingivo-labial fold, just below the posterior margin of the nostril, is carried forward into the nasal

<sup>1</sup> British Med. Journal, 1885, vol. i., p. 888.





PLATE IV

THE ANATOMY OF THE HUMAN HEAD AND NECK, BY J. H. COOPER, M.D., F.R.C.S., LONDON, 1832.



cavity, after which the whole of the upper lip, including the margin of the nostril, is severed by cutting upward. The ala of the nose is now cut through, in a similar manner, in a line continuous with that of the first incision, and the cut extended along the lateral face of the nose, to a point just below the inner angle of the eye (see Fig. 158). The flaps being now drawn to one side and the other, reveal freely the bony orifice of the anterior nares, which can be enlarged by means of the rongeur, or other suitable instrument, to such size as may be demanded for the special manipulation for which the operation is done.

#### HUGUIER'S OPERATION.<sup>1</sup>

This procedure is designed to gain access to the naso-pharyngeal cavity, and consists of a temporary resection or depression of the lower portion of the superior maxillary bone. The mouth being opened, a transverse slit is made through the soft palate on the affected side, at its junction with the hard palate, after which, by means of a Bellocq's sound, a strong ligature is passed through the inferior meatus, thence through this slit in the soft palate, and finally drawn out through the mouth. The two ends of the thread are then tied together. An incision is then made from the commissure of the lips on the affected side, through the whole thickness of the cheek, outward to the anterior border of the masseter muscle. A second incision is made from the upper border of the ala of the nose on the affected side, along the nasal furrow, separating the ala from the nostril, and is prolonged in the median



FIG. 159.—Lines of Cutaneous Incision in Huguiet's Operation.

line, through the whole thickness of the upper lip, through its free border (see Fig. 159). The large triangular flap thus formed, is then dissected up, exposing the entire anterior surface of the lower half of the superior maxillary bone. The first incisor tooth on the affected side is then drawn, and by means of a bone forceps, one

<sup>1</sup> *Gaz. des Hôpitaux*, 1861, vol. xxxiv., p. 337.



blade of which is introduced into the nostril, the alveolus is cut through. A flat-bladed saw is then passed into the nostril, and the entire hard palate is sawed through, taking care not to injure the oral periosteum. The finger is inserted at the posterior extremity of the first incision, and the tuberosity of the superior maxilla is felt. Directly behind this is felt the projecting pterygoid process of the sphenoid bone, which is cut off by means of bone forceps. A narrow-bladed saw is then introduced behind the tuberosity of the superior maxilla, and the body of this bone is sawed through from behind forward, the section being made into the inferior meatus of the nose (see Fig. 160). Traction downward is then made by means of the ligature previously passed through the



FIG. 160.—Lines of Bony Section in Huguier's Operation.

nostril and through the opening in the palate, and the entire lower half of the superior maxillary bone is depressed into the mouth, hinging upon the undivided oral periosteum of the hard palate. Free access is thus gained to the pharyngeal cavity, as well as to the antrum. The cutaneous incisions necessitate the application of ligatures to the facial artery at two points. Aside from this, no vessels of any considerable size are divided. The bony and soft parts can be replaced, and the displaced bone may or may not be held in position by means of

metallic sutures, according to the choice of the operator. The wounds in the soft parts are closed by means of sutures, and union readily takes place. It is ordinarily necessary for the patient to wear an obturator in the mouth for some time to prevent displacement of the bony fragment.

The above description is taken from Huguier's original report, and is that of an operation which was done for the removal of a fibroid tumor of the naso-pharynx. In this case, however, considerable bony necrosis resulted, which marred the success of the operation, bony reunion not having taken place at the end of three years, and all the teeth of that side having become carious. This result was undoubtedly due largely to the fact that the pedicle consisted simply of the periosteum of the oral face of the hard palate, and that this had been subjected to the risk of injury, by sawing through the bone from above, with a straight saw.

CHEEVER'S OPERATION.<sup>1</sup>

This device accomplishes the same purpose as that of Huguier, in a much simpler, and certainly in a much safer manner. The external incision is confined to one simple cut, extending from just below the inner canthus of the eye on the affected side, to the outer angle of the mouth (see Fig. 161), after which the anterior face of the lower portion of the superior maxilla is exposed, by dissecting up the flaps, and drawing them to one side. The next step consists in the extraction of the first incisor tooth on the affected side, after which the alveolus is cut through by means of a bone forceps. The finger is now passed behind the body of the upper jaw, and the tuberosity being located, a straight saw is passed behind this, and worked up along



FIG. 161.—Line of Cutaneous Incision in Cheever's Operation.

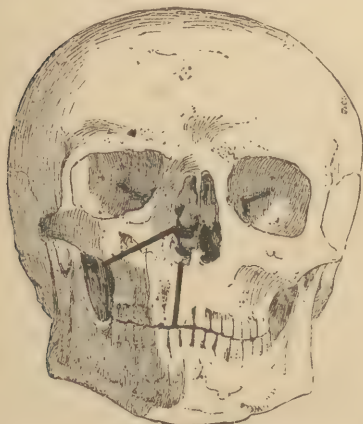


FIG. 162.—Line of Bony Section in Cheever's Operation.

the pterygo-maxillary junction, and brought forward, thus severing the body of the bone (see Fig. 162). The mass is now seized with the forceps and depressed, thus fracturing the hard palate. In this manner the whole mass drops into the oral cavity, thus opening a wide access to the naso-pharynx.

Cheever's original operation was done in a case of fibroma, and seems to have been a complete success. The parts were restored to position, and the bony fragments held in place by means of a wire suture around the teeth, the soft parts being united in the usual manner. Bony union is reported as having been complete at the end of a few weeks, no serious complications having occurred.

<sup>1</sup> Boston Med. and Surgical Jour., 1867-8, vol. lxxvii., pp. 161-164.

The advantages of this procedure over that of Huguier consist in the fact that a more complete circulation is maintained through the

hard and soft palate, and also through the posterior palatine vessels, which pass through the pterygo-maxillary fissure.



FIG. 163.—Lines of Cutaneous Incision in Cheever's Double Operation.

#### CHEEVER'S DOUBLE OPERATION.<sup>1</sup>

(See Colored Plate II., Fig. II.)

This consists in the depression or temporary resection of the lower halves of both superior maxillary bones at the same time, and is performed as follows:

An incision, commencing just below the inner canthus of the eye, is carried downward along the nasal furrow, to the base of the nose, when

it is carried around the margin of the nostril, which it opens, to the median line, and extended down through the upper lip. A similar incision is made on the opposite side, until it meets that already completed (see Fig. 163). The triangular flap is dissected from the anterior face of each superior maxillary bone, until the lower portion is completely exposed. The superior maxillæ are next cut through from behind forward, the saw being carried so that it emerges in the middle meatus of the nasal cavity (see Fig. 164). The septum is now completely divided from before backward, by means of scissors, when the mass is depressed into the mouth, hinging on the pterygoid processes behind. This operation was originally done by Cheever in a case of naso-pharyngeal fibroma, with fatal results. This, however, was not necessarily attributable to the operation, as the patient was in an ex-

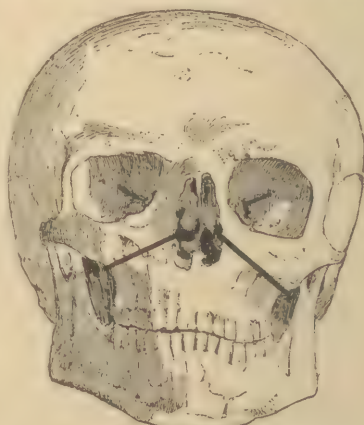


FIG. 164.—Lines of Bony Section in Cheever's Double Operation.

<sup>1</sup> Med. and Surg. Reports of the Boston City Hosp., 1870, p. 164.



ceedingly enfeebled condition. In a case subsequently operated on by Tiffany<sup>1</sup> by this method, the results were very successful.

#### WATERMAN'S OPERATION.<sup>2</sup>

Waterman, for the purpose of removing a nasal growth, resorted to a procedure, very similar to that of Cheever, of depressing the lower portion of the jaw, only that after having exposed the face of the bone, and having made an incision in the median line, through the hard palate, and also a lateral bony incision above the alveolus, the fragment was depressed in such a manner as that it hinged upon the hard palate posteriorly, in much the same manner as in Cheever's double operation. The steps of the operation do not differ in any essential manner from those of Cheever's.

#### ROUX'S OPERATION.<sup>3</sup>

This rather curious operation consists of a temporary resection of the superior maxilla, in which the external incisions are confined to those points at which the bony sections are made for severing the bone from its attachments. Perhaps a better appreciation of the operation will be arrived at, by describing somewhat in detail its various steps.

*First Step.*—Division of the fronto-malar attachment.

For this purpose, a horizontal incision over this articulation, about half an inch in length, is made with a scalpel, and carried well down upon the bone. Then, by means of a chisel or chain-saw, the frontal process of the malar bone is cut through, to the speno-maxillary fissure.

*Second Step.*—A vertical incision of the same length is made over the zygoma, which is cut through in a similar manner.

*Third Step.*—An incision is made from the inner canthus of



FIG. 165.—Lines of Cutaneous Incision in Roux's Operation.

<sup>1</sup> Trans. M. and Chir. Fac. Maryland, Balto., 1878, pp. 180-187.

<sup>2</sup> Boston Med. and Surgical Journal, vol. lxxx., pp. 165.

<sup>3</sup> Gaz. des Hôpitaux, 1861, vol. xxxiv., p. 354.

the eye, along the nasal furrow, around the base of the nose, stopping at the columna, or, the incision may be extended through the median line, completely dividing the upper lip (see Fig. 165),



FIG. 166.—Lines of Bony Section in Roux's Operation.

after which, by means of a chain-saw or scissors, the whole wall which separates the nasal cavity from the orbit is cut through (see Fig. 166), the section extending into the spheno-maxillary fissure.

*Fourth Step.*—This consists of separating the pterygo-maxillary articulation, by means of a stout pair of scissors, carried up behind the tuberosity of the superior maxilla, this procedure being facilitated, of course, by sliding back somewhat the flap of the integument, and operating through the oral cavity.

*Fifth Step.*—The hard and soft palate are now separated on the same side, by a transverse incision, after which the first incisor tooth is drawn and the hard palate, together with the alveolus, completely divided by means of the saw (see Fig. 167).

The superior maxilla is thus completely separated from all its bony attachments, and is simply held in place by the soft palate and external integument. The further procedure consists of inserting a pair of stout flat-bladed forceps, into the line of incision through the hard palate, when by forcibly opening its blades, the whole body of the upper jaw is forced laterally and upward into the temporal fossa, thus securing a fairly wide opening through the hard palate into the nasal cavity and naso-pharynx, for the removal of growths in this region, or for such other indications as may be demanded, after which the parts are easily restored to position, and secured by means of sutures in both the hard and soft parts.



FIG. 167.—Line of Bony Section of the Palate in Roux's Operation.

This operation was only suggested by Roux, who described it in full detail, and demonstrated it on the cadaver. According to his

statement, a space half an inch in width is secured by this means, for operating in the cavities above. He further adds, however, that this may be somewhat increased, by cutting off the pterygoid process at its base, and also removing a portion of the vomer. If necessary, the same temporary resection may be performed simultaneously on the opposite side.

This operation is an exceedingly ingenious one, although it would scarcely seem to afford as free an access to the nasal and naso-pharyngeal cavities as can be obtained by Cheever's, or even some of the simpler operations. Furthermore, although no large vessels are encountered during the operation, hemorrhage from the smaller vessels might occur, and be of such a nature as to render its arrest by no means an easy matter. As far as I know, this operation has been performed in but a single instance on the living subject. The result in this case, however, seems to have been entirely successful, the procedure having been adopted by Fontan<sup>1</sup> in a case of naso-pharyngeal fibroma.

#### ANNANDALE'S OPERATION.<sup>2</sup>

In order to gain access to the naso-pharynx, for the removal of neoplasms, Annandale exposes the anterior nares, as in Rouge's operation. The septum is then divided throughout its entire extent, where it unites with the superior maxillæ. Next the soft parts covering the hard palate are divided in the median line, the soft palate may or may not require division, according to the extent of the growth. The hard palate and alveolus are then cut through in the median line, and the two jaws separated, by prying them apart. The amount of separation obtainable, varies from one-half to one inch. The growth is then removed by forceps or the snare, the parts are replaced, and held in position by sutures through the alveolus and palate.

#### LANGENBECK'S OPERATION FOR THE TEMPORARY RESECTION OF THE UPPER PORTION OF THE SUPERIOR MAXILLA.<sup>3</sup>

(See Colored Plate IV., Fig. I.)

This operation is really designed to obtain access to tumors invading the spheno-maxillary fossa, and yet is very properly recorded in this connection, as one of the means by which access is gained to the naso-pharyngeal cavity. It consists of a temporary resection of the upper portion of the superior maxillary bone,

<sup>1</sup> *Revue Mensuelle de Laryng.*, 1888, No. 4, p. 198.

<sup>2</sup> *Lancet*, Jan. 26th, 1889, p. 162.

<sup>3</sup> *Deut. Klin.*, 1861, p. 281.



and is performed in the following manner: By means of the scalpel, a curved incision is made through the integument, commencing at the lower border of the nasal bone, and carried



FIG. 168.—Lines of Cutaneous Incision in Langenbeck's Operation.

outward with a downward curve, beneath the prominence of the malar bone until it reaches the middle of the zygoma. A second incision, commencing just below the inner canthus of the eye, is carried along, immediately below the border of the orbit, horizontally and outward, until it meets the first incision (see Fig. 168). These incisions are carried well down to the bone. At the point at which the incisions meet, the finger is inserted directly into the sphe-

no-maxillary fossa, the sphe-no-palatine foramen being usually dilated by the growth, in many cases allowing the finger to pass directly into the pharynx. A straight saw is then inserted through this opening, its movement being guided by the finger in the mouth, when the body of the superior maxillary bone is cut directly through, first, in the line of one incision, and subsequently in the line of the other, the section being carried completely into the nasal cavity (see Fig. 169). An elevator is now introduced behind the mass, which is pried out of its position, and turned directly inward over the eye of the opposite side, thus hinging upon the nasal process of the superior maxillary bone and the external flap, which, it will be noticed, is not dissected from the bone.

If the lower of the two primary incisions is made to commence at the ala of the nose, instead of the upper border of the ala, the operation may be to an extent facilitated, in that in this case the

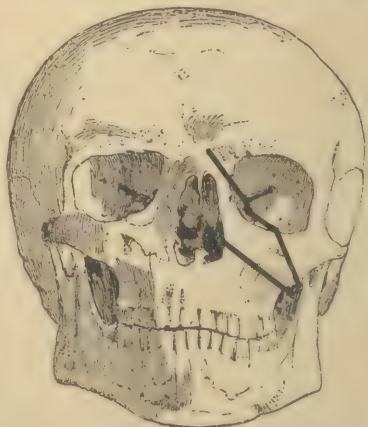


FIG. 169.—Lines of Bony Section in Langenbeck's Operation.

section of bone can be made from within outward and from before backward, the saw being inserted into the nasal cavity.

In making the primary incisions, it should be borne in mind that the facial artery is severed by the lower cut, which, therefore, should be made first, and the hemorrhage properly arrested. This complication is to an extent avoided by an incision which commences at the lower border of the nasal bone. Aside from this, the operation is not attended with any notable hemorrhage, unless it be dependent on the neoplasm itself, for the removal of which the operation is done. The fragment is easily replaced, and need only be secured by sutures through the soft parts.

#### BILLROTH'S OPERATION FOR THE TEMPORARY RESECTION OF THE SUPERIOR MAXILLA.\*

This operation is designed to accomplish the same purpose as that of Langenbeck, but differs from it somewhat in the details. It is performed as follows:

An incision is made with a bistoury through the integument, commencing at the root of the nose, and extending in the median line to its tip, when it is carried into the nostril, upon the side on which the operation is to be performed. A second incision is made, commencing at this nostril, and extends horizontally across the cheek, for about an inch and a half, to near the anterior border of the masseter muscle. A third incision, commencing at the root of the nose, is carried outward, just below the margin of the orbit, parallel with the lower incision, and to the same length (see Fig. 170). The nose is now severed by means of a chisel or other instrument in the line of the median incision, after which, by means of a straight saw, the body of the superior maxilla is completely divided from within outward, in the line of each horizontal incision (see Fig. 171). The whole mass is now pried out of its position by means of a leverage,



FIG. 170.—Lines of Cutaneous Incision in Billroth's Operation.

\* Arch. für Klin. Chir., 1869, vol. x., p. 106.

acting in the nasal cavity, and turned outward upon the cheek, hinging upon the pterygoid process. The line of incisions through the bone, in this operation, are much the same as those in Langenbeck's operation; hence, the source of hemorrhage is largely

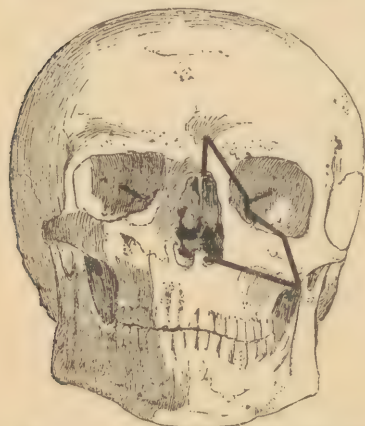


FIG. 171.—Lines of Bony Section in Billroth's Operation.

in the facial artery, which requires ligation. The course of the upper incision lies very near the infra-orbital foramen. This, however, is avoided with a little care; otherwise, troublesome hemorrhage might arise from the artery, which emerges at this point. The restoration and securing of the fragment in position, after the completion of the operation, is, of course, a simple matter.

#### BOECKEL'S OPERATION.

Boeckel,<sup>1</sup> in operating upon a case of naso-pharyngeal fibroma, adopted essentially Billroth's method, with some minor changes, although reporting it as a new operation.

It may be noted, that instead of carrying his saw completely outward in the upper section of the bone, he stops at the infra-orbital foramen, and then, in order to avoid the danger of wounding the artery, inserts the needle of the chain saw through the spheno-maxillary fissure, carrying it subcutaneously until it passes through the spheno-maxillary fissure and emerges at his lower incision, when he divides the union between the malar and superior maxillary bones subcutaneously, after which the remaining portion of the floor of the orbit is divided by scissors.

#### DEMARQUAY'S OPERATION.<sup>2</sup>

This distinguished surgeon performed the operation which bears his name, for the first time, upon a patient aged forty-nine, a female, suffering from a naso-pharyngeal tumor which had invaded the antrum and the left nasal fossa. The operator was deterred from making an incision on the dorsum of the nose, on account of the age and the poor condition of the patient. An incision was made from the internal angle of the left eye, following the nasal furrow, to the free margin of the nostril. From this point, a horizontal incision was carried outward to the anterior border of the

<sup>1</sup> *Gaz. Méd. de Strasbourg*, 1872, No. 2, p. 18.

<sup>2</sup> *Buil. de Thérapeutique*, Paris, 1862, vol. lxi., p. 276.



masseter muscle (see Fig. 172). Two flaps were thus formed, a nasal and a malar.

These two being dissected up, together with the underlying periosteum, Liston's forceps were applied, and a portion of the nasal process of the superior maxilla, and the entire anterior wall



FIG. 172.—Lines of Cutaneous Incision in Demarquay's Operation.

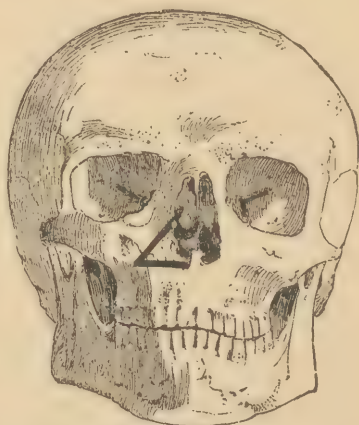


FIG. 173.—Lines of Bony Section in Demarquay's Operation.

of the antrum were removed, enough of the nasal process being left to retain the shape of the nose (see Fig. 173). The tumor was then extirpated by means of forceps, and the margins of the wound brought together with metallic sutures. The patient was cured with scarcely any disfigurement, and the anterior wall of the antrum was reproduced.

### MAISONNEUVE'S OPERATION.

(See Colored Plate I., Fig. II.)

Permanent resection of the whole of the superior maxilla was done as early as the latter part of the last century, although Syme,<sup>1</sup> of Edinburgh, was the first to resort to this procedure for the removal of a nasal fibroid, while soon afterward, and apparently without knowledge of Syme's operation, the same procedure was adopted by Eve,<sup>2</sup> for the removal of a similar neoplasm, and Mott:<sup>3</sup> although

<sup>1</sup> Edinburgh Medical and Surgical Journal, 1832, vol. xxxviii., pp. 322-324.

<sup>2</sup> Southern Medical and Surgical Journal, Augusta, 1836-37, vol. i., pp. 78-80.

<sup>3</sup> American Journal of Medical Sciences, 1843, N. S., vol. v., pp. 87-91.

in the latter case, the whole of the jaw was not exsected. This seems a somewhat formidable operation for the removal of a simple nasal or naso-pharyngeal tumor, and certainly at the present day no one would resort to so radical a measure, in that a partial



FIG. 174.—Line of Bony Section in Maisonneuve's Operation.

resection fulfils for this purpose every indication that the complete resection affords, a truth very early recognized by Maisonneuve,<sup>1</sup> whose operation, first proposed in 1860, has never been specially improved upon. This operation is done without making any external incisions whatever through the integument, although, if necessary, the upper lip may be divided from the margin of the nostril to the free border on the affected side. The lip being drawn well up over the nose, the anterior surface of the lower portion of the bone is exposed, by sweeping the scalpel along the gingivo-labial fold, until the bony opening of the anterior nares is exposed. The soft palate is separated, by a transverse incision, from the hard palate, and then a first incisor tooth having been drawn, the whole of the hard palate, together with the alveolar process, is divided by means of bone forceps, introduced through the nostril (see Fig. 174). Then, with the one blade of the cutting forceps introduced into the nostril, and the other applied externally along the anterior face of the bone, the whole mass is severed, the section being carried back as far as the tuberosity, at its junction with the pterygoid process (see Fig. 175). The fragment is now seized by forceps, and wrenched from its position. This procedure is attended with no notable hemorrhage, aside from that which is dependent

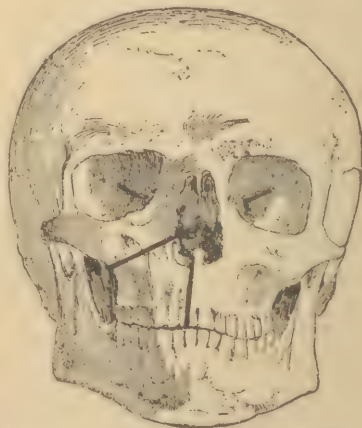


FIG. 175.—Lines of Bony Section in Maisonneuve's Operation.

upon the character of the tumor, or other complications. It gives ample access to the nasal and naso-pharyngeal cavities, for the removal of such tumors as may exist there, and a large freedom of

<sup>1</sup> *Union Médicale*, 1860, Second Series, vol. vii., pp. 393-96.

movement for subsequent manipulations. After the tumor has been removed, the subsequent treatment consists of such simple measures as are suggested by the rules of ordinary surgical practice. At the expiration of a few weeks, an artificial palate is worn with comfort, and subsequently, a set of false teeth adapted to that side. The deformity resulting from this operation is very slight ordinarily, and the only objection that lies against the operation, is the loss of the teeth on that side, an objection easily obviated. The very great advantage of the operation over temporary resection, lies in the fact, that permanent access is gained to the nasal or nasopharyngeal cavity, for the treatment of the stump, for the observation of any tendencies to recurrence, and the prompt application of such remedies as may be indicated. In other words, if recurrence occurs, a second operation is rarely necessary, as would be demanded probably in the majority of cases, where a temporary resection only had been performed. Hence, when we remember that this operation is done in the large majority of instances for fibroma of the naso-pharynx, and that these are met with in young children, where there is a marked tendency to recurrence, it would seem in every way, that indications are best carried out, where a radical operation becomes necessary, by the performance of a permanent, rather than a temporary resection. As regards sarcoma, in which a recurrence is to be expected almost with certainty, the successful eradication of the growth certainly can be far better hoped for by the permanent removal of a portion of the jaw, in that after removal of a growth of this kind, the most constant and observant watchfulness is required, if we expect to successfully control its subsequent development.

While this operation of Maisonneuve, therefore, is undoubtedly the best which has yet been devised for accomplishing its special indications, there are several others involving permanent resection of a portion of the superior maxillary bone, which may be indicated in special cases, prominent among which are Péan's, Bérard's, Huguier's, and Vallet's.

#### PÉAN'S OPERATION.\*

(See Plate III., Fig. II.)

This consists of a permanent resection of the posterior portion of the lower half of the superior maxilla, and is performed as follows:

A linear incision, commencing at the root of the nose, is made in the median line, by means of a bistoury, and carried down to

---

\* "Leçons de Clin. Chir.," 1879, vol. ii., p. 128.



the tip of the organ, and into the nostril, and subsequently extended from the lower border of the nostril, through the median line of



FIG 176.—Line of Cutaneous Incision in Péan's Operation.

the upper lip, which is completely divided (see Fig. 176). The flap is now dissected up, until the bony opening of the anterior nares and the anterior surface of the superior maxilla is completely exposed. The next step consists in separating the periosteum from that portion of the hard palate which the operator designs to remove. The second bicuspid tooth is now drawn, and with a stout pair of cutting forceps, the alveolus at this point is cut through into the cavity of the antrum, when the forceps are still further inserted, one blade in the antrum, and

the other in the oral cavity. The section is extended back until it reaches the median line at the posterior border of the hard palate (see Fig. 177). The external wall of the antrum is now

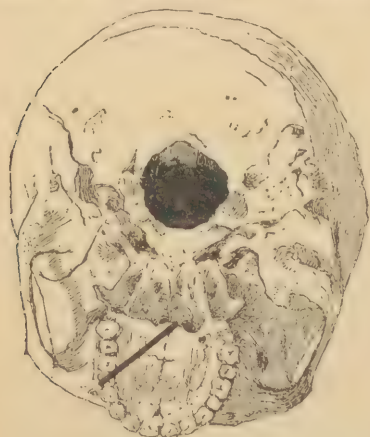


FIG. 177.—Line of Bony Section in Péan's Operation.



FIG. 178.—Lines of Bony Section in Péan's Operation.

divided in a line extending up to a point immediately below the infra-orbital foramen, when from this point, by means of forceps, a section is made, extending backward in a horizontal direction,

to the pterygo-maxillary junction (see Fig. 178), after which the mass is seized with a strong forceps, and wrenched from its position. In this manner access is gained to the posterior portion of the nasal cavity, and the naso-pharynx. The operation is comparatively simple, and involves no serious complications, and while affording a somewhat restricted opening, possesses the advantage of leaving in position the incisor teeth, the patient being deprived simply of the last three molars, and one bicuspid.

Péan evidently had some idea of the restoration of the hard palate, in directing the preservation of the periosteum, although just how this is to be accomplished, he does not make clear.

#### BÉRARD'S OPERATION.<sup>1</sup>

This operation is devised to obtain access to the cavities of the nose and naso-pharynx, by means of a permanent resection of the central portion of the superior maxilla, without disturbing the alveolar process, and is made as follows:

The anterior face of the bone is exposed by making an incision



FIG. 179.—Line of Cutaneous Incision in Bérard's Operation.

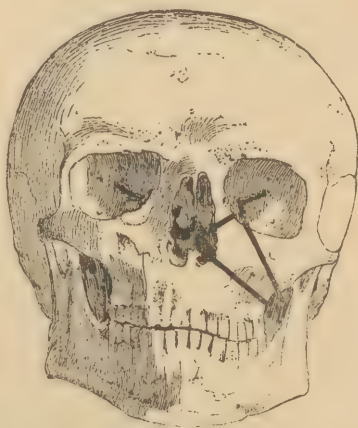


FIG. 180.—Lines of Bony Section in Bérard's Operation.

through the integument either along the median line of the nose, or the side of the nose, extending down through the upper lip (see Fig. 179). After the bony orifice of the anterior nares, together with the anterior wall of the superior maxilla, is exposed, a section

<sup>1</sup> Dict. en 30 vols., t. xxviii., p. 367.

is made of the nasal process, by means of a cutting forceps, one blade of which is introduced into the anterior nares, and the other into the orbit, the direction of the incision being obliquely outward. A second incision is made in a similar manner through the malar bone, at its junction with the superior maxillary bone, after which a section is made from the lower border of the bony orifice of the anterior nares, through the body of the bone, to the pterygo-maxillary junction (see Fig. 180). The detached fragment is then wrenched from position, thus removing the outer wall of the nasal cavity, together with the anterior wall of the antrum, giving access to the nose through an opening, which really is commensurate with the size of the antral cavity.

#### HUGUIER'S OPERATION.<sup>1</sup>

This operation differs in no marked degree from that of Bérard except that he removes a smaller fragment. The outer bony section, instead of being extended through the malar bone, is made through the body of the superior maxilla, almost entirely within the malo-maxillary junction (see Fig. 181). Both Bérard and Huguier report having made successful operations in the manner above described, although it is not easy to understand, why a prominent source of difficulty would not be, in the lack of a firm support to the alveolar process, after the removal of so much of its bony attachment, for, as we see, after the removal of the fragment, this process is held in



FIG. 181.—Lines of Bony Section in Huguier's Operation.

position for a time certainly, by the surviving portion of the pterygo-maxillary junction, together with the intermaxillary junction.

#### VALLET'S OPERATION.<sup>2</sup>

This procedure consists of a permanent resection of a still smaller portion of the body of the superior maxillary bone, and is done as follows: An incision, commencing just below the internal angle of the eye, is carried along the nasal furrow, and around the root of the nose, to the nostril, and then extended from the inner border of the nostril, down the median line, completely

<sup>1</sup> Bull. de la Soc. de Chir., 1850, p. 574.

<sup>2</sup> Gaz. des Hôpitaux, March 31st, 1859.



dividing the upper lip. The flap being dissected off, exposes the bony opening of the anterior nares of that side, together with the anterior wall of the superior maxillary bone. A section of bone is now made with a chisel, commencing at the lower border of the bony opening of the nares, and extending outward and parallel with the alveolus, as far as the first bicuspid. A similar section is made, commencing in the nares, and parallel with this, extending outward, just below the infra-orbital foramen. The outer ends of these two incisions are united by a third section (see Fig. 182), when, by means of stout scissors or forceps, the outer wall of the nasal cavity is cut, first below, and then above, in the lines of the original parallel sections through the anterior wall of the superior maxilla. The fragment is now wrenched from its position. As will be seen, Vallet in this operation simply removes the anterior and inner wall of the maxillary sinus, which is thus opened into the nasal cavity, giving a free access to this passage, although a somewhat limited one to the pharyngeal vault.



FIG. 182.—Lines of Bony Section in Vallet's Operation.



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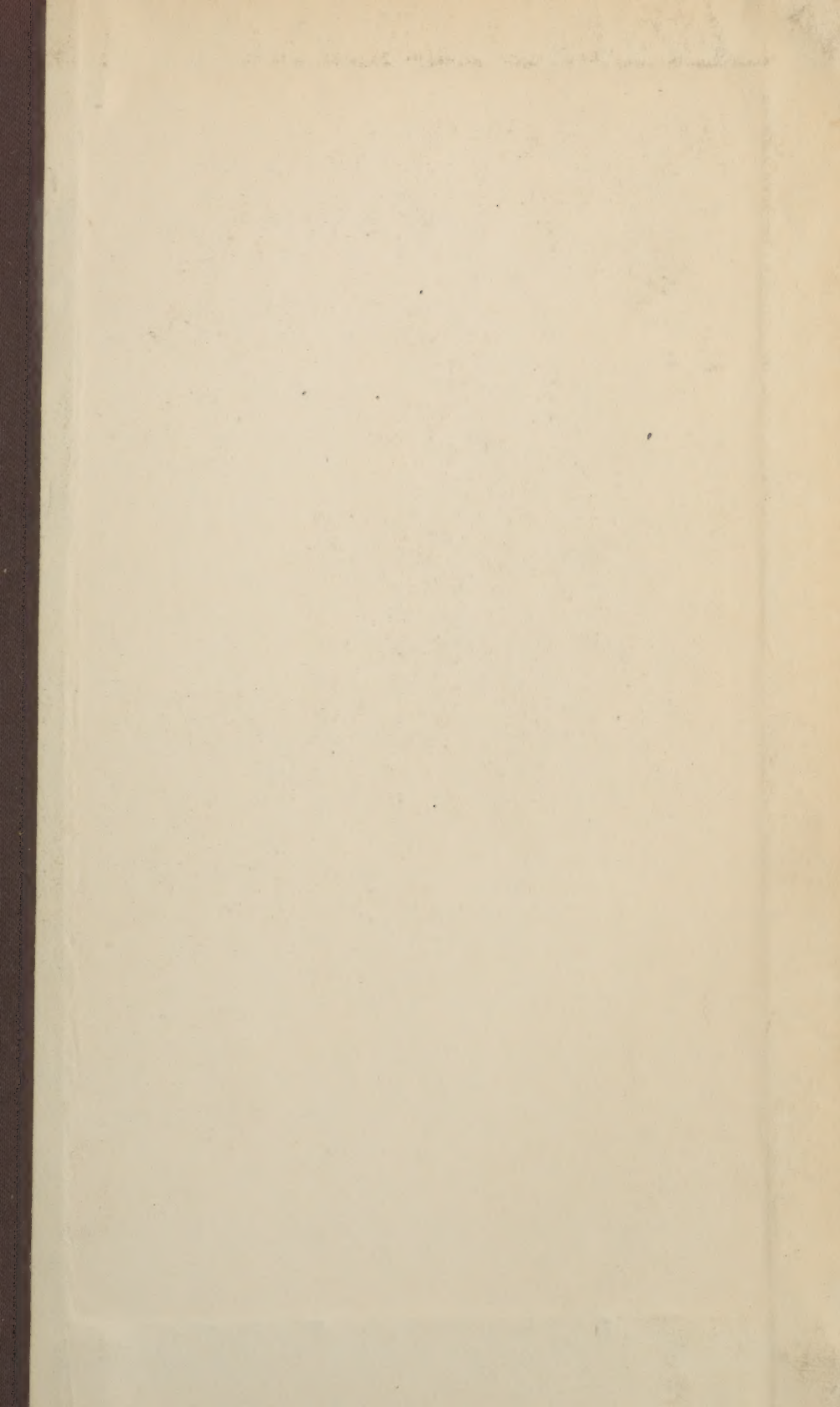






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